RAILROAD GAZETTE

SATURDAY, NOVEMBER 8, 1873.

Abbe's Bolt-Forging Machines.

The object of the inventor of the herewith illustrated machine has been to produce a tool which should forge the four or six sides of the heads of bolts without moving the bolt blank from the position in which it was first held. The forging dies are wider than the bolt-head, so as to leave no fins on the corners of the head. Four dies are used, and the bolt is held firmly and securely in one position until finished, always, it is claimed, producing a bolt under the head just the size of the rod, with the sides of the head in parallel lines with the body. All classes of bolts and shapes of head desired are made, especially the fish joint or T headed bolts, which, we are informed, cannot be made on machines where the bolt is turned to receive the action of the forging dies. The production of the apparatus varies with the size of the bolt to be forged, from eight to sixteen perfect bolts per minute; and changing from one size of bolt to another, or from one shape of head to another, it is stated, requires hardly a moment's time, especially adapting the device to the use of railroad shops.

Among the points of advantage claimed are, first, simplicity; every bolt and joint being dispensed with except those which produce the result of working the four dies, while there are neither gears, cams nor springs about the machine, thus saving to the user both the expense and the time occupied in making necessary repairs. The slides are all gibbed so that any trifling wear can be readily taken up without removing the slides to put on a thin strip of iron. The sliding surfaces are always running in oil, as they are placed above the water and cinders. The machine is provided with a cupboard for its tools, a new feature in this class of devices.

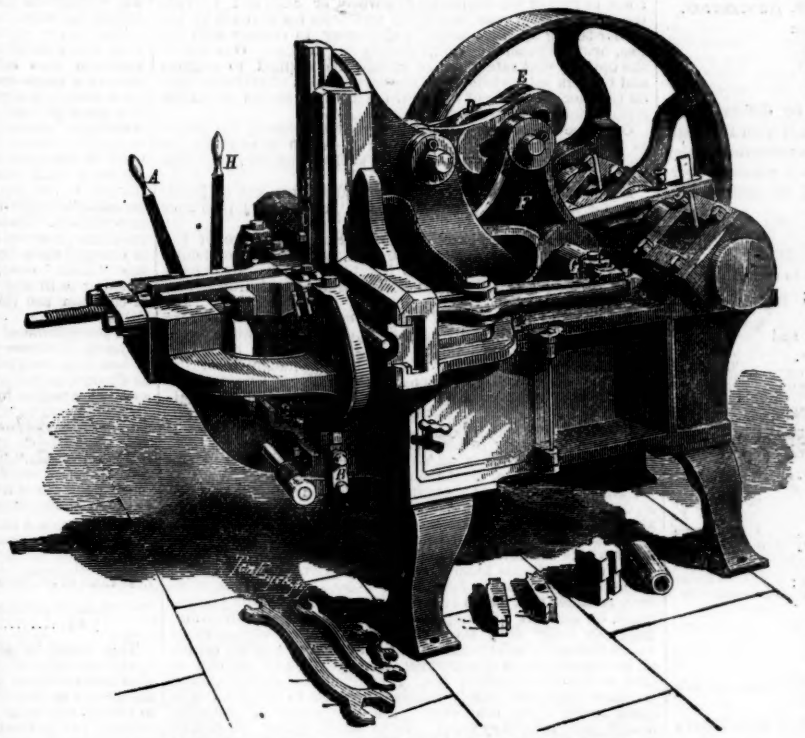
The holding vice is operated by a handle, *A*, attached to the cross shaft. On each end of the latter are the arms, having links, *B*, attached to work the sliding frame, which open the radial arms that carry the holding dies. These holders are backed up by a filling-in piece, adjusted forward by means of the screws. The length of the bolt is guaged from one inch upward by adjusting the end screw. The driving wheel is in operation all the time; the machine only when it is forging the bolt. The long slide carries the bottom die on its lower end. The top slide die, *C*, works on the face of the long slide, which is actuated by two levers, *D*, *E*, having curved slots, the top die slide having one lever with reverse curve, all working on the same pin. The pin in the upset carrier, *F*, passes through the curved slots, and as it acts back and forth moves them in opposite directions. The slide dies have their motion by means of links, *G*, attached to the upset carrier.

When the bolt blank is placed in the holders and clamped tightly by means of the handle, *A*, the handle, *H*, clutches in the driving wheel with the shaft, the upset carrier advances by means of the connections to upset the iron, the forging dies being all open. As the upset carrier recedes to half stroke, the side dies compress the sides of the head, and at extreme end of stroke the top and bottom dies act upon the other two sides of the head, and so continue to do until the bolt is finished, which is done in four revolutions of the driving wheel.

Two sizes of these machines are now being manufactured, one for both large and small bolts, and the other more particularly for the smaller sizes.

Two patents have been granted for this header, bearing date of May 1, 1870, and June 6, 1871, respectively, while a third is now pending.

The inventor is John R. Abbe, and the manufacturers, S. C. Forsaith & Co., Manchester, N. H., at whose works the machines can always be seen in practical operation.



ABBE'S PATENT BOLT FORGING MACHINE.

Lesley's Micrometer for Field-Note Plotting.

The following paper by Mr. J. Peter Lesley, Professor of Geology and Mining in the University of Pennsylvania, Editor of the *United States Railroad and Mining Register*, who is a most accomplished topographer, was read before the American Philosophical Society, April 18, 1873:

I desire to place on record in the proceedings of the Society a description of my micrometer for plotting field-notes, which appears to be coming into favor with civil and mining engineers.

It was many years ago that the need of such a little instrument forced itself on my attention, as a substitute for a vernier attachment to a scale for use on the office table. The strain upon the eyes in constant plotting on small scales, say on the common scale of 1,000 feet to the inch, or the not uncommon one of 2,000, is greater than the best human organs of vision can endure without permanent injury, to say nothing of the loss of time in adjusting the dividers, or applying the paper edge, if a paper scale be used directly. Every field worker who has constructed elaborate contour line maps covering an extensive region of country will bear me out in this assertion.

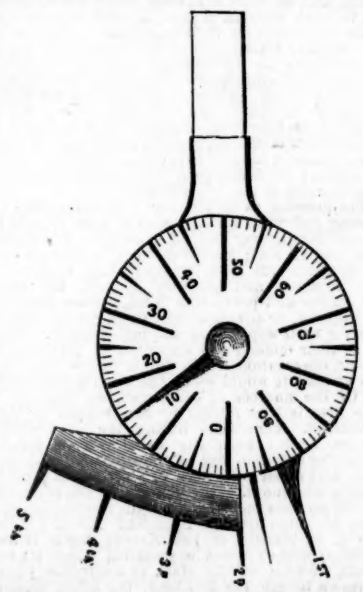
Considering also the liability to error in counting the decimals and hundredths or thousandths of the scale unit of distances, after hours of application to work has lowered the tone of the nervous system, I sought some mechanical substitute analagous to Mr. Cleaver's protractor, now in almost universal use for plotting courses with ease and precision.

Many forms of such an instrument passed through my mind; but over-occupation, or perhaps laziness, prevented me from taking the necessary steps to realize the idea in even tentative forms, although I spoke of it several times to Mr. Young, the accomplished and experienced instrument-maker of Philadelphia, now dead.

During my wanderings in Europe in search of health in 1866 1867 and 1868, I was several times the guest of my old friend and fellow-laborer in the anthracite coal fields (1853), Professor Edouard Desor, at his charming residences on the Combe Varin and in Neufchatel, Switzerland. One day we strolled into the well-known philosophical instrument manufactory of Mr. Hipp, to whom, among other things, I mentioned the need of a micrometer divider for plotting, and drew at his request three of its possible forms, such as seemed to me the most feasible, giving him an order for one, and leaving him to select the form he preferred.

On my return to Philadelphia in the spring of 1868 I received it in a broken condition. The chain had been snapped by some custom-house official, too curious to learn its nature to treat it with much delicacy of handling. It was, however, easily repaired, and I found it all I could desire—handy, accurate in its action, and perfectly relieving the eyes from the strain of measuring. It was much admired by my professional acquaintances, but remained a solitary specimen until Mr. Kerr, State Geologist of North Carolina, begged permission to have it copied at Mr. Young's (Jr.) establishment. This was in the winter of 1871, '72. I have since been informed by Mr. Kerr that his order was never filled; at least, he never received his micrometer. The original was in constant use by one of my assistants in my office throughout the spring and summer of 1872. When the course of instruction in the Department of Science of the University of Pennsylvania commenced last fall I accustomed my special geological students to use this instrument among others, and ordered of Heller & Brightly, instrument makers, a duplicate of it—set, however, not to centimeters and millimeters, but to inches and hundredths of an inch. While making it, Mr. Eckley Coxe and other civil and mining engineers saw it, and ordered others like it for their own use, and these orders have become so numerous that it has evidently taken its place among the accepted apparatus of the engineer's office-table. I hope many will in future enjoy the relief and comfort from it which I have enjoyed since 1868.

I was urged to patent it, as Mr. Cleaver patented his protractor. But I feel a natural prejudice against patenting a little thing which may become to some extent a public benefit, at all events within the not altogether narrow limits of one of the scientific professions. I desire, however, to prevent any one else from hampering its progress by a patent, and to that end beg leave to place this record of its invention among the proceedings of this Society. Any one can obtain the instrument free of patent royalty, from the makers above named, or may order it made for themselves anywhere else.



This Micrometer consists of an arc set with three, four or more needle-points fixed at intervals of one centimeter, one half inch, or any other unit adopted for the survey, equivalent say to 100 feet (yards, links, rods, &c.)

A handle projects upwards from the inside of the arc by which to hold it, and by which it may be applied to the line of course and be gently rotated, so that each needle point in its turn pricks its (100 feet) unit distance along the line.

Between the last two needle points floats a supernumerary needle-point or compass-leg, jointed high up on the handle, and swung or floated to and fro by a simple ratchet and watch chain, turned at will by means of a button, projecting from the centre of a circular disc on the handle; the disc circle being divided into hundredths (thousandths, &c.), and traversed by an index which starts from and comes round to a stop at zero.

While the index travels over the disc from 0 to 100 the supernumerary needle point travels from needle-point to needle-point, one unit. Example of use: Suppose a distance 327 feet to be laid off on a course; the fifth needle is applied to the station (point of tangent, or point of curve) and the arc rotated so that the fourth needle pricks 100, the third 200, the second 300 feet. Then, the index being brought to 27, the floating needle pricks 327. See woodcut.

Mr. Eckley Coxe has had a useful addition made to his instruments in the shape of a set of removable rings, divided for 100ths, 1000ths, 66ths, 33ds, etc., etc. Two little screws hold the ring in place, whichever one may be in request for any particular plotting. When plotting on the scale of some other unit of distance is required, another ring is substituted.

Now Get Your Track and Road-bed Ready for Winter.

TO THE EDITOR OF THE RAILROAD GAZETTE:

"Beautiful snow" says the song, and, in truth, the beauty of a snow-flake is hard to beat; but, probably, the author of the song was not inspired by a three days' blockade when all the mercury was in the bulb. Henry Ward Beecher once took a ride on a snow-plow in Northern New York. He enjoyed it hugely, and to him it was chock full of poetry; but it was like the boy stoning the frogs; it was fun for him, but the stockholders didn't enjoy it first-rate. The division over which Mr. Beecher took his ride had been prepared for winter, and all went well; but on the next divison a snow-plow was entirely demolished, and three locomotives badly wrecked in consequence of the plow encountering a pile of frozen ballast. Thus a neglect, or oversight, of what might seem a trifling matter cost the company some thousands of dollars. It would have cost about twenty-five cents to remove the gravel before it had become frozen and covered with snow.

It is advisable to examine the road carefully and be sure that everything is removed that might possibly interfere with the safe passage of the snow-plow. This should be done before a fall of snow is expected to insure safety. All loose ties, rails, wood piles, timbers lying around bridges, culverts, etc., should be moved out of reach of the wings and scrapers of snow-plows. Ballast should be cleared away in dressing off both between and outside the rails, and if any considerable quantity remains after giving a good finish, it should be piled up out of the way for future use. All planks at road and farm crossings should be securely spiked down and their ends champfered off, so that they will clear scrapers and all bolts that run a little too low. The ballast lying under the planks at crossings should be cleared away so as to not quite touch the plank; for the ballast is always wet under the planks and will expand in freezing, which tears up the planks in a dangerous manner. There is also danger in filling track too full in cuttings, or any place where there is imperfect drainage. Of course drainage will be attended to in due season, but there are places where it is impossible to prevent the ballast retaining water to such an extent as to cause excessive expansion, raising the gravel, which is a fruitful source of accident in winter. A dry road-bed is the thing, and track-men can hardly be more profitably employed at any season of the year than in perfecting drainage, but more especially before the commencement of winter. Loose boards, ties, fence rails and all "traps" of a like nature that have been placed too near the track at cattle-guards during the "cattle season" for temporary use, should now be removed to make room for the big plow. In short, it is of prime importance that all obstructions or anything that will interfere with the free use of appliances for removing snow or ice be made safe for that operation. And when it is considered that the line is ready for winter in this respect, it is well to run the plow, with wings extended and scrapers down, cautiously over the road, to make a certainty of guess-work. Platforms may have been erected too near the track since last winter, or some new style of bridges built, wood and lumber piles out of place and out of mind, and should be put out of the way. Snow fences should not be forgotten. Build new ones where needed, and repair the old ones. A few rods of snow fence is often worth thousands of dollars, although costing but a trifle.

In some sections of the country there is much trouble in cuttings, from a sort of slush that oozes from the slopes, filling the ditches, and, if not removed, running on to the track and freezing in a way that is dangerous. This stuff is of about the consistency of molasses, and does not give any trouble during warm weather; but, unlike the molasses, it runs the best in cold weather. The heat of the sun dries it up, and it is not seriously affected by rains, but frost has the effect of greasing it up so that it soon finds its way into the ditch, from which it must be removed. It moves the liveliest in the coldest weather and be-

comes mixed with snow and makes a dauby mess, difficult to handle. Where this causes much trouble, it is a good plan to clear the ditches thoroughly and cover them with planks or boards, allowing a free passage for water below, and holding the mud above, which greatly facilitates its removal. Old ties and planks, if not too much decayed, may be used for this purpose to good advantage. By adopting this plan, both snow and mud will be kept out of the ditches, and an immense amount of labor saved. The water will take care of itself, and the slush can be readily removed from the reservoirs or sewers above the ditch, from time to time, as occasion may require. Thousands of bolts are out of the joints, and they are unsafe and the cause of many of the unexplained derailments, and it is the usual custom with trackmen at this season to go over the track and replace them and screw them up. In doing this, some very strong men use all their strength on the wrench. This is wrong. In straining the bolt now, it would possibly "stand the pressure," but at the first cold snap the contraction would snap the bolt like glass. It is well enough to screw the nuts up moderately snug and see that they are kept so.

Material of every description is usually scattered along the track, and it should now be picked up and placed where it can be had when wanted. Leave nothing to be covered with snow and lost, or to be hunted for when wanted in a hurry. Don't let a few pleasant days drive the thoughts of winter from your mind, but keep busy thinking what may be done to promote safety and comfort, and don't forget to do it. Do it now. If there ever was an old adage worth remembering, it is this one: "Take time by the forelock." And when you get him there, hold your grip.

WM. S. HUNTINGTON.

Bowstring Girders.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is often a satisfaction to reach a result by different processes. Without wishing to detract in the least from Professor Smith's originality in determining "that in a bowstring girder the maximum work of the diagonal ties has a constant horizontal component," as stated in your issue of the 13th of September last, I offer the following solution:

Let l = the length of each bay;
N = the number of bays in the straight chord;
p = the load at each joint from the end to the nth bay;
n = the number of the bay considered;
F = the strain on the diagonal tie;
θ = the inclination of the diagonal tie; and
D = the depth of the truss at the center.

Then we have

$$F = \frac{(N-n+1)(n-1)\,p}{2N\cos\theta}. \qquad (182)$$

Hence the horizontal component of the strain is

$$F\sin\theta = \frac{(N-n+1)(n-1)}{2N}p\tan\theta.$$

But

$$\tan\theta = \frac{N^2 l}{D\,[N^2-(N-2n+2)^2]} \qquad (173)$$

$$= \frac{N^2 l}{4D(N-n+1)(n-1)};$$

which substituted above gives

$$F\sin\theta = \frac{Nl}{8D}p,$$

which is a constant and agrees exactly with Professor Smith's deductions.

The equations (182) and (173) are taken directly from Wood's "Bridges and Roofs."

D. V. W.

THE MASTER MECHANICS' ASSOCIATION.

Report of Committee on the Efficiency of Check or Safety Chains on Engine, Tender, and Car Trucks in Lessening the Danger Resulting from Running off the Track.

To the American Railway Master Mechanics' Association:

GENTLEMEN—Your Committee, to whom was referred the subject of "The Efficiency of Check or Safety Chains on Engine, Tender and Car Trucks in Lessening the Danger Resulting from Running off the Track," would respectfully report that they issued circulars in which such questions were asked as in our opinion were calculated to elicit answers from the various superintendents of motive power and master mechanics addressed, that would enable the Committee to arrive at definite conclusions upon the subjects referred to, and enable them to recommend to the Association, for its consideration and adoption, those plans and parts of this subject about which there might be but little diversity of opinion. The following is a copy of the circular referred to:

SAFETY CHAINS.

"*Mr.* ——, ——*Railroad:*

"DEAR SIR—The Committee appointed by the American Railway Master Mechanics' Association on the subject of "The Efficiency of Check or Safety Chains on Engine, Tender and Car Trucks in Lessening the Danger Resulting from Running off the Track," would respectfully solicit your opinion on this subject, and we present below some interrogations for your consideration. Yet we desire you will not be confined entirely to them in your answers, but will give us such matters of information as will be calculated to bring out the facts as to whether safety chains can be so applied that their efficiency may, on the whole, warrant the expenditure in their application to all engine, tender and car trucks, and their maintenance in a condition to be entirely reliable under all ordinary circumstances when subjected to such strains as may be brought upon them in case of accidents:

"1. Do you consider it practicable to apply safety chains and their fastenings of sufficient strength to all classes of trucks, so as to be entirely reliable under ordinary circumstances, and would their efficiency and certainty in lessening the danger in case of accidents warrant the cost of application and maintenance in good condition thereafter?

"2. What should be the diameter of the iron composing the links of safety chains to the engine trucks, and what for chains to tender and car trucks, and what should be the length of the links of chains to each class of trucks?

"3. Should the point of attachment of the chain to the frame of engine, tender, or car, be as directly over where it is attached to the truck as practicable, with but sufficient length of chain to permit the ordinary movements of the truck while on the track, or should the chain be fastened diagonally from the points of attachment, and in the direction of the strain brought upon it, preventing the truck from turning, or assuming a position to go off at a tangent from the direction of the rails, in case of running off the track?

"4. Should all trucks have safety chains attached to each of the four corners, or do you deem two chains sufficient for each engine and tender truck?

"5. Do you know of any instances where the use of safety chains prevented serious damage or destruction of life or property?

"6. Is it your opinion that, as a means of safety, all center pins and king bolts of engine, tender, and car trucks should, in all cases, be securely keyed, so as to prevent the center pins from being drawn out of their places and to hold the trucks in their place, under all circumstances?

R. WELLS,
Master Mechanic, Jeffersonville, Madison & Indianapolis Railroad.
CHAS. R. PEDDLE,
Superintendent Motive Power Terre Haute & Indianapolis Railroad. } Committee
J. L. WHITE,
Master Mechanic Evansville & Crawfordsville Railroad.

"Please address replies to R. WELLS, Jeffersonville, Madison & Indianapolis Railroad, Jeffersonville, Ind."

Your committee received answers to their circulars from twenty-four different superintendents of motive power and master mechanics in the United States Central America and Canada. Of this number, nineteen were of the opinion that all locomotives, tender and car trucks should have safety chains attached of sufficient strength to prevent the truck from assuming a position to run at an angle from the line of the track, in case of ordinary derailment, and to hold up the corner of the truck in case of the breaking of a wheel or axle, and prevent the truck in such case from being torn from its position by the corner falling upon the track and coming in contact with the ties, bridge timbers, or cattle guards on the line. One was of the opinion that safety chains should be applied to engines and tenders only, while three considered them unreliable, and on that account did not attach them to the trucks under the rolling stock in their charge.

Of those recommending the use of safety chains, ten give it as their opinion that ⅞ inch round iron should be used for the links in chains to engine trucks, and twelve consider ¾ inch iron sufficient.

For chains to tender trucks, two advise the use of ⅞ inch iron for links, fifteen ¾ inch iron, and four think ⅝ inch iron sufficient.

For passenger and baggage car trucks, twelve are of the opinion that ⅞ inch iron should be used, and five recommend ⅝ inch iron; and for the chains to freight car trucks, nine are in favor of using ¾ inch iron, and nine consider ⅝ inch iron strong enough.

In regard to the length of link for each size of chain, there seems to be but little diversity of opinion; with two or three exceptions, all recommend the standard adopted by chain-makers known as "cable." The point of attachment of the chain to the frame of the engine, tender or car, is considered best when as near directly over the point where attached to the truck as practicable by nine, while an equal number believe that the chains should be attached so as to hang diagonally, or nearly in the direct line of the strain in preventing the truck from turning, so as to run at an angle from the line of road in case of derailment. One recommends two chains for each forward corner of engine trucks attached—the one immediately over, and the other diagonally from the point where attached to the truck. Another considers the point of attachment to the frame should be in a line directly forward of the point where the chain is attached to the trunk.

The opinion seems to be unanimous that where safety chains are used there should be four chains to each truck; three, however, consider that two is sufficient for each engine and tender-truck, on account of being usually run in but one direction. Eighteen reply that they know of a number of instances where the use of safety chains, in their opinion, was the means of preventing much destruction of property, and perhaps in some instances the loss of life. It is given also as the opinion of some that had safety chains been used in instances that came under their observation, the destruction of property would have been very much less in those cases. In regard to keying the king-bolts and center-pins of all classes of trucks, so as to hold them securely to the frame or body, there is but little difference of opinion expressed. Sixteen give it as their opinion that the trucks to engines and tenders should be thus secured, and fourteen express the opinion that the king bolts to car trucks should also be keyed. Four consider that trucks should not be keyed to the bodies of cars; that in case of a serious accident more harm than good results from holding the truck to the body.

Your committee have carefully considered the answers given to the questions propounded in our circular upon this subject and the reasons given for the conclusions arrived at by those answering, and, as there is in some points a wide difference of opinion, we have thought it best, in order to present the subject to the convention for their consideration and action, to review the subject, taking each of the questions in the order in which they occur on the circular, and where a difference of opinion has been expressed we have taken the liberty to recommend what in our judgment seems to be the best, giving our reasons for so doing. Your Committee very much regret that so few of the master mechanics, out of the great number to whom circulars were sent, found it convenient or the subject of sufficient interest to them to reply, and that our report must on that account be based upon the opinion and views of so small a proportion of the whole number.

1. To the question as to whether it is practicable to apply safety chains and their fastenings so as to be reliable in cases of ordinary derailment, and in consequence lessening the danger in case of such accidents, there is scarcely any difference of opinion. All seem to agree that if chains are of sufficient strength and properly applied, the results in lessening danger and preventing in many cases great destruction of property, or perhaps life itself, would much more than pay for their application and maintenance. Those giving this as their opinion cite a number of instances coming under their observation which go to prove that in those instances at least it would seem the results were very satisfactory. Of the number of such cases we only cite one or two. The first is that related by Mr. Setchel, of the Little Miami Railroad. Some time during the past winter both wheels were broken from the back axle in the forward truck under the tender of one of their engines hauling an express train, that seven miles were run after such breakage before anything was known of the matter, the safety chains holding the truck up from the rails, the train running along at the usual rate, no other damage resulting. Another instance is related by L. H. Waugh, of the Kansas Pacific Railway, as coming directly under his own observation, where six cars in a freight train, running off the track at a defective joint, were hauled across a bridge 120 feet long, the safety chains holding the trucks close to the rails, and the cars passing in that way entirely over the bridge, and receiving but little if any injury, and were afterward drawn on the rails and continued on in the train to their destination. One car in this train that was without safety chains received so much damage that considerable repairs were required before it could be put in service again. One of your Committee witnessed an instance where the forward axle in the truck of an engine broke while running at the rate of twenty miles per hour with a passenger train, the wheel running into the ditch, and the safety chains holding up that corner of the truck until the train was stopped, the other wheels in the truck remaining on the rails, no other damage resulted. A great number of instances can be mentioned where safety chains have proved efficient; and when of proper strength but few instances can be shown where they have not been efficient in ordinary cases. Chains will not in *all* cases, nor under *all circumstances*, prove efficient, in consequence of the extraordinary strains brought upon them in case of running over obstructions, or where the trucks are subject to unusual force from accidents other than those resulting from a broken wheel or axle, or simply derailment. There are no mechanical difficulties to overcome in order to secure sufficient strength of chain or fastening to insure efficiency under ordinary circumstances. So far as the trucks under locomotives and tenders, passenger and baggage cars are concerned, there is scarcely any difference of opinion among master mechanics. All agree that each truck should have good chains securely fastened.

There is some difference of opinion, however, as to whether the benefits to be derived from the application of safety chains to freight cars would warrant the cost of application and maintenance. A large majority favoring their application; the minority claiming that whenever such chains are called into requisition they have almost invariably failed and proved unreliable. The question would naturally arise, if safety chains can be made sufficiently reliable to warrant their application to locomotive, tender and passenger-car trucks, and it is a wise precaution to use them, and if experience has shown that in a number of cases that danger has been lessened and the destruction of property prevented by their use on the class of trucks referred to, can they not be made equally efficient, reliable and valuable in their application to the trucks of freight cars? The statements made in regard to the failure of chains on freight car trucks are doubtless in many cases true, yet they cannot be regarded as conclusive arguments against their use. It is well known to mechanics who have given this subject attention that safety chains, as they are applied to freight cars in a large majority of cases, especially on cars built by contract, are only safety chains in name, they are scarcely a good pretext—being either entirely too light, or the fastenings fearfully defective. A very common practice is to bend a piece of ⅝ or ¾ inch round iron into the shape of a hook at one end, the other end being pointed and a thread cut on it; this end is screwed into the side-sill or end-sill of the car to the depth of about three inches, the hook having no other support than that derived from the part screwed into the sill. This furnishes the fastening for the chain, and the consequence is that when a strain of a few hundred pounds is brought upon the chain, if the latter does not easily break the "hook" does, or pulls out of the timber, sometimes splitting it in the operation. Other styles of fastening are in common use that are equally unmechanical and as unreliable.

In the opinion of your Committee, as well as that of a large majority of those giving an opinion on this subject, there seems to be no good reason why safety chains cannot be made as effective and reliable attached to the trucks of freight cars as when attached to any other class of trucks. It will not be found difficult to devise fastenings for the chains that will be reliable under all ordinary circumstances, and that too without any danger of splitting or doing other damage to the frame of the car. The cost of applying good chains and their fastenings to cars would average about $10 each. Estimating the life of a car to be eight years' service, the account to safety chains would be as follows:

Cost of chains and fastenings	$10 00
Interest for eight years, at eight per cent	6 40
Total	$16 40
Less value of old chains and fastenings	3 00
Total to be charged to account of safety chains for eight years	$13 40

This would be an average of $1.67½ per car per year. To equip five hundred cars with safety chains, at the above rates, would represent an annual expenditure of $837.50. Your Committee are of the opinion that safety chains can be attached to freight cars so as to be efficient under all ordinary circumstances, and be the means of lessening danger and preventing destruction of property; yet we are not prepared to give an opinion as to whether the advantages to be derived from the use of safety chains on five hundred cars would average each year $837.50 or not, as compared with the same number of cars having no safety chains, and we therefore submit this part of the subject to you for further consideration.

2. From the various opinions given as to the diameter of the iron composing the links of chains best suited for the different classes of trucks, we recommended that for trucks under locomotives the chain links be made of a good quality of ⅞ inch round iron; for tenders, passenger and baggage cars, and for all classes of freight cars ¾ inch iron be used. The fastenings of the chains should in all cases equal in strength that of the chain attached. The usual proof or test for chains made of ⅞ inch iron being fourteen tons, and for those of ¾ inch iron ten tons, which, in our opinion, gives sufficient strength of chain for the purpose designed. For length of links we would recommend that adopted by chain makers as a standard for the different sizes of the iron used known as cable. A longer link for chains of freight-car trucks, where considerable length of chain is required, would doubtless answer as well, besides costing less and having a less number of joints subject to wear.

3. There is much difference of opinion expressed as to the best point for attaching safety chains to the frame or body, relative to the point of attachment to the truck. One-half the number of master mechanics giving an opinion on this subject are of the opinion that the point of attachment of the chain to the frame or body should be as near directly over the point where attached to the truck as practicable, while the other half give it as their opinion that the point of attachment should be such as to hold the chain diagonally, and as far as practical, at least nearly in the direct line of the strain brought upon it, in preventing the truck from turning so as to run off at an angle from the line of the track in case of derailment. Each plan has its advantages and disadvantages, and the difference in the conclusions arrived at doubtless arises from the different objects sought to be accomplished. If the object of a safety chain is simply to hold the truck from falling to the ground in case of a broken wheel or axle, or to hold the truck in place when off the rails and passing over openings, such as cattle-guards or trestles, where under other circumstances the truck would fall from its place, and thus be a serious obstruction to the trucks and wheels immediately behind it, the plan of attaching the chain to the frame or body immediately over the point of attachment to the truck will best accomplish that object. For instance: if a wheel or axle under the forward truck of a locomotive having good safety chains attached to the corners of the truck and to the frame immediately over such point, no change of position would occur in the truck in consequence of the weight thrown upon the safety chain at that corner, and in all probability the other wheels of the truck would not—except occurring on the outside in a curve in the road—be thrown from the rails before

the train could be stopped. But if the chain was attached diagonally, so as to be at an angle say of 45 degrees to the direction of the weight to be supported, the strain upon the chain in consequence of the angle would be double that of the weight to be sustained, and the force tending to throw that end of the truck toward the opposite side would be equal to the weight sustained or downward strain, which, unless the flange of the opposite wheel was considerably worn, would be sufficient to cause the flange to climb the rail and throw that wheel off the track. But if the object is only to prevent the truck from assuming a position to go off at a tangent from the line of the track, in cases of ordinary derailment, it is evident that the nearer the chain can be brought to the direction of the force to be overcome the better, and that object can be accomplished best by diagonal chains.

As the accidents against which the use of safety chains are intended as a means of lessening danger are of a variety of kinds, it would seem best that some plan of attachment should be adopted that will be a compromise—that will be best in the majority of cases when called into requisition. Your committee are of the opinion that the point of attachment to the frame or body should not be far from that directly over where the chain is attached to the truck, the angle of a line from the point of attachment on the truck to that on the frame or body, and a perpendicular, being about twenty degrees, and in the direction that such angle will be increased most by the turning of the truck from the line of the rails, would, in our opinion, suit all cases better perhaps than any other except chains to six-wheel trucks under passenger or other cars. These should be attached diagonally, as there is but little danger of a truck of that class dropping upon the rails in case of a broken wheel or axle. The point of attachment of chains to the frame of locomotives should be inside, or toward the center of the track from where attached to the truck, for the reason that in case of a broken wheel or axle the weight thrown upon the safety chains attached to the frame inside of the point where attached to the truck will tend to prevent the truck from turning toward the side having the breakage, and will on that account keep the opposite wheel on the rail. The angle of the chain should, however, not much exceed twenty degrees from the perpendicular.

We do not consider that any rule that could be given would apply to all cases equally well, and in the application of chains to the different styles and classes of trucks some variation from it will be found necessary to suit particular cases. No greater length of safety chain should be allowed than is requisite in passing the shortest curves upon which such cars or engines are run.

4. There should, in all cases where safety chains are used, be one attached to each corner of the truck. Upon this point there seems to be no difference of opinion.

5. With three exceptions, all who have replied to the fifth question report instances as coming under their observation where, in their opinion, destruction of property was prevented by the use of safety chains. It cannot be determined what damage would have resulted in these cases had there been no chains used, but judging from that resulting in cases where such chains were not used, their opinion is very decided in favor of their use. It is not stated by any that to their certain knowledge life has been saved in instances where chains were used, that would have been lost if safety chains had not been attached, yet the inference is that such has been the case in several instances reported. If, then, it is decidedly the opinion of the men who have had many years' experience in the care and supervision of the rolling stock on the different railways of the country, that where safety chains have been applied they have in very many cases prevented destruction of property, it is equally conclusive that their application to all classes of rolling stock will in the same degree contribute to the saving of life, and where the question of human life is concerned the cost of application and maintenance cannot be considered in the question at issue.

6. To the question, whether as a means of safety the center pins and king bolts to engine, tender and all classes of car trucks, should be securely keyed, so as to prevent such pins and bolts being drawn out in case of derailment, or accidents from other causes, and thus securing the trucks in their position to the engine, tender or car, there seems to be but little difference of opinion. All concur in the opinion that in engine and tender trucks the pins should be keyed, and with the exception of four, are in favor of keying the king bolts in all classes of car trucks, believing that in very many cases by having them thus secured to the body in case of accidents much less injury would occur on the whole. Of those dissenting from this opinion, one concludes that the safety chains are sufficient without the addition of keys in king bolts, and two give it as their opinion that in case of a severe accident the sooner the car bodies are clear of the trucks the less damage results in most cases. The opinion of the latter, that in case of serious accidents it would be best to have trucks freed from the body of the car, is doubtless correct in some cases, yet it is a fact well known to all who have closely observed the matter, that in very many instances much less damage occurred from the fact that the trucks were held in place by keys in the king-bolts than if they had been left free and had drawn out. One of your Committee witnessed an instance where a night express train was thrown from the track by the washing away of a part of the embankment, and a passenger coach filled with passengers was prevented from being turned over into the water by the "ballast" given the body of the car by the trucks, the king-bolts being drawn out as far as the keys in them would permit. The trucks resting at an angle, on the side of the embankment, were so firmly fixed in the soft earth that the body of the car was held with the sides at an angle of 45 degrees from the perpendicular, and prevented from turning over into the water by the keys in the king bolts.

It would seem that if there are good reasons for securing the trucks of engines, tenders and cars running in passenger trains by keys in the center pins, cars running in freight trains ought not to be an exception in that particular. One advantage claimed in having the king bolts of cars free to draw out is that in clearing a wreck no difficulty is experienced in separating the trucks from the car bodies and removing them separately if desired, whereas, if keyed, it would often be found difficult on that account to separate them, and equally difficult to remove them from the line without separating. This, doubtless, would sometimes be the case, yet many instances occur in which removal would be greatly facilitated if the trucks had remained in their places attached to the car body. It will be found that cars are much less likely to turn over in case of accident if the trucks are secured to the body so that they cannot ordinarily be displaced, and in case the car does turn over the trucks go with it, and are not so likely to be damaged as if left on the road, and in many instances the cars can be turned back and put on the track with but little trouble and slight damage.

A great many instances occur when cars are thrown from the track that they require to be jacked up, and the trucks turned somewhat, or require to have blocking put under the wheels before they can be pulled out of the positions in which they are found and put on the track. In all such cases the matter is greatly facilitated if the trucks are keyed to the body and can be jacked up with it. Many other reasons could be given in favor of having trucks secured to the body of the car, but your Committee deem it unnecessary. The expense of putting keys in center pins and king bolts is so trifling as to be scarcely worth mentioning. In accordance with the almost unanimous opinion of all who have expressed themselves to us on this subject, and our own observation, we believe that on the whole much less damage would result in case of accidents if center pins and king bolts of all classes of trucks were keyed, and we recommend it as a means of safety.

Respectfully submitted,

Committee.

R. WELLS, Master Mechanic, Jeffersonville, Madison & Indianapolis Railroad.

C. R. PEDDLE, St. Louis, Vandalia, Terre Haute & Indianapolis Railroad.

J. L. WHITE, Evansville & Crawfordsville Railroad.

On motion the report was received.

DISCUSSION OF THE REPORT.

Mr. WELLS, Jeffersonville, Madison and Indianapolis Railroad: Mr. President, there is one point in connection with this subject which the Committee seems to have neglected, and on which they make no recommendation. That is, whether the cost of chains on freight cars is counterbalanced by the advantages of safety, etc., derived from their use. The cost of a set of chains would probably be ten dollars a car, or a dollar and sixty-five cents a year, taking the average lifetime of a car. Now, for five hundred cars that would be about eight hundred dollars, and I would like to hear from the convention as to whether the advantages to be derived from the use of chains on freight cars would amount to that much over and above those of cars having no chains.

Mr. KEELER, Flint & Pere Marquette Railroad: Mr. President, the Committee do not tell us as much about the advantages of different fastening points as I wish they did. In reference to this question we must take into consideration that we have two kinds of accidents to contend against. One is accidents from defective wheels and axles; the other, our liability to be thrown off the track. Most of our breaks occur at the axle. One trouble is that car inspectors are not careful enough to throw suspicious axles out. A good car inspector who understands his business will throw all axles out that look anywhere defective, and if that work is done well there is comparatively little danger from axles. Our greatest liability seems to be from being thrown off the track, and in that case the fastening should be at the point of the greatest strain.

Mr. WHITE, Evansville & Crawfordsville Railroad: Mr. President, in answer to the gentleman who has just taken his seat, I would like to ask the Convention in case, for instance, the right-hand wheel should break, the chains being suspended at an angle of some forty-five degrees from perpendicular, whether the weight thrown upon the truck at that instant would not have a tendency to draw the forward end of the truck around and press the flange upon the rail, preventing the unbroken wheel from remaining on the track?

Mr. FEY, Grand Trunk Railway: Mr. President, the chains, if properly fastened, I should think, would keep the truck in place. One of the great causes of accidents is broken rails. If a road has the broken rails properly looked after there will not be so many broken wheels and axles. I think myself that the roads of this country are so rapidly improving that we may look forward to the time when accidents from defective rails will be fewer than those from defective axles and wheels. It is easier to keep a road in order than it is to guard against defective axles and wheels. Sometimes it is impossible to detect defective wheels, and that, I think, will be found to be the principal difficulty.

Mr. KEELER, Flint & Pere Marquette Railroad: Mr. President, the gentleman's experience is altogether different from mine. Nearly all our accidents occur from being thrown off the track. I don't think we have taken a broken wheel or axle from under our cars since I have been on the road.

Mr. GORMAN, Toledo, Wabash & Western Railway: Mr. President, we have experienced run-offs from a good many different causes. Many times we can't tell exactly what the cause is. The question seems to be now which is the most safe and proper method of keeping the trucks from slewing around when they do go off. I agree with the Committee exactly, that the safety chains are too light—altogether too light. When you go off the track with one wheel you want to have the truck kept in position and as near the track as possible. If your chains are not strong enough to keep the truck in place, around goes the truck. The remedy for this is the employment of good, heavy, substantial safety chains, and I would have them placed on every car and engine on the road.

Mr. SPRAGUE, of Pittsburgh: Mr. President, I would like to ask whether any of the members present know of check chains tearing out sills? I have been an advocate of safety chains for years, but a number of persons have told me that they will pull sills all to pieces. I would like to know whether such is the fact.

Mr. GORMAN, Toledo, Wabash & Western Railway: Mr. President, I will say that I never knew an occurrence of that kind. I do not think it is a frequent occurrence, at least, when the chains are properly fastened. Even if that were the case, it would be better to tear the sill of the car out than to do worse.

Mr. WELLS, Jeffersonville, Madison & Indianapolis Railroad: Mr. President, I will state for Mr. Sprague's information that I have seen cases where the sill was split, but it was on account of improper fastening. If the fastenings had been properly made all the strain would not have come upon the sills as it did, and no injury would have resulted.

Mr. LILLY, of Indianapolis: Mr. President, the report of the Committee is very elaborate, and as it has nearly exhausted the subject I would move that the discussion be closed.

Mr. WELLS, Jeffersonville, Madison & Indianapolis Railroad: Before we pass from this subject, Mr. President, there is one point in the report upon which I hope the Convention will take some action. The Committee has made no recommendation in regard to the application of safety chains to freight cars, as they could not agree as to whether the advantage to be derived from them would warrant their use.

The President ruled Mr. Lilly's motion out of order.

Mr. GORMAN, Toledo, Wabash & Western Railway: Mr. President, in regard to Mr. Wells' remarks I would say that, in my judgment, safety chains should be applied to all trucks, to all trains, whether passenger or freight. We all know that they are a great protection to trains, and they consequently must be a saving. Nine times out of ten, when one truck gets out of place and has no chains to hold it to the track, it throws its own car and five or six others off the track. I would like to see it adopted as the sense of this Association that all trucks under all engines, tenders and cars should be provided with safety chains.

Mr. PHILBRICK, Maine Central Railroad: Would it be proper to recommend by the same vote that these chains be three-quarter inch iron as recommended by the Committee?

Mr. GORMAN, Toledo, Wabash & Western Railway: They should be at least three-quarter inch iron, and more, if necessary.

Mr. PHILBRICK, Maine Central Railroad: Mr. President, here is a stick five by twelve; to attach to that a chain of three-quarter inch round iron, it strikes me, would be a strain very much larger than that stick can hold. I never saw a fastening put where this stick goes that would hold one-half of it.

Mr. GORMAN, Toledo, Wabash & Western Railway: Mr. President, I think the wood will hold it; and unless you have the chains strong enough to stand the strain of a sudden jerk, such as they are often subjected to, it is no use having them at all.

Mr. WELLS, Jeffersonville, Madison & Indianapolis Railroad: There are three pieces between the center of the car and the sides to stand the strain, and it appears to me they will hold chains of the size proposed.

The question coming to a vote, Mr. Gorman's motion to recommend the application of safety chains to all engines, tenders and cars was adopted.

On motion of Mr. Chapman, of the Cleveland & Pittsburgh Railroad, the discussion was closed.

Light Railroads.

The following are extracts from a paper read by Mr. H. S. Ellis (a Director of the Bristol & Exeter Railway Company) before a meeting of the Exeter Chamber of Commerce, held at the Guildhall, Exeter, June 18:

Since the annual meeting of the Exeter Chamber of Commerce, when, at your invitation, I had the honor of describing the light railway recently constructed by the Duke of Buckingham, I have been asked by several landowners, engineers and others interested in the construction of cheap railways, to furnish them with a fuller description of it. I gladly avail myself, therefore, of your invitation to bring the subject of light railways again before the Chamber. I firmly believe that the attention which you are directing to the subject will lead to a greater use of such railways in this part of the kingdom, where thin population and agricultural produce scarcely justify the construction of expensive extensions of the usual Parliamentary description. The value of light railways and tramways in agricultural districts cannot well be over-estimated, as, from the absence of cheap transit, manure, lime, etc., are almost at prohibitory prices. Farmers in the neighborhood of Northmoor have to pay the sum of half-a-crown a bushel for lime, and at Hemyock the inhabitants pay no less than 5s. per ton for the carriage of coal. Within the last few weeks I have met several landowners in Devonshire, who have expressed their willingness to give their land for the construction of light railways in their respective districts; and I have reason to know that engineers have already been called in to survey the country and give estimates for the construction of such lines. But the question now arises, Which kind of light railway should be constructed? There are at present three different kinds which are attracting public attention:

1st. Light railways which follow as nearly as possible the surface of the ground, avoiding the hills and the necessities for expensive over or under bridges, and by traveling at low speeds, avoiding the necessity for expensive signal and other apparatus, usually required by the Board of Trade for through lines. The gauge is usually the national one, viz., 4ft. 8½in.

2d. The patent narrow-gauge railway, invented by Mr. Fell, which, by being constructed on timber supports of different heights, to suit the undulations of the country, avoids to a great extent severance of lands and expensive cuttings and banks. The gauge of such lines varies from 3 inches to 2 feet. A railway of this description, about a mile in length, has been recently constructed at Aldershot in 45 days, for the purpose of conveying stores to the victualling office. The gauge of this line is only 18 inches, but it is capable of conveying siege guns seven tons in weight. The cost, I believe, is about £2,000 per mile.

3rd. The wire tramway, which like the Fell system, is mounted on iron or timber supports, to suit the undulations of the country; but is only adapted for the conveyance of loads not exceeding 10 cwts., and is generally employed for short distances only—250 yards to three or four miles. One has been constructed as long as 15 miles. There is one at the Devonshire Clay Works 250 yards in length, and another at Brendon Hills three-quarters of a mile in length.

I have lately had an opportunity of personally inspecting all three different kinds of railways, and each has good points to recommend it; but I am satisfied that a light railway similar to the Duke of Buckingham's is the most advantageous where it is practicable, and especially so where passenger traffic may be reasonably expected. I have had the honor to receive from the Duke himself the following very full and valuable statement with regard to the cost of his Grace's railway, as also of the receipts and the working expenses, which, by his most courteous permission, I am enabled to lay before you.

The cost of the Wotton Railway, including sidings and two goods sheds (one 25ft. by 25ft., and one 60ft. by 25ft.), is rather less than £1,400 per mile, exclusive of the value of the land. The main line is very nearly 7 miles long. The land belongs principally to the Duke of Buckingham. The gradients from Quainton to Wotton are favorable, two short inclines of about 1 in 78, in opposite directions, being the worst, and the general inclination being downwards to Wotton, which is 50 feet below Quainton. The gradients from Wotten to Brill are heavy—the ascent being, with one exception of not quite a quarter of a mile, continuous for 2¾ miles, varying from 1 in 100 to 1 in 51. The latter is a quarter of a mile; but an incline of 1 in 64 on a curve of 12 chains radius for a quarter of a mile is quite equal to the steeper gradient. The total ascent is about 130 feet in this portion of 2¾ miles. The line was commenced on 8th September, 1870. The first portion to Wotton was in use on the 1st April, 1871, and the greater portion of the remainder was brought into use for mineral class, agricultural produce, etc., in November—the last ¼ mile and Brill station were brought into use last April—a branch of 1¼ miles is now (in May) in the course of construction. The working of the line is carried on by Messrs. Chaplin & Horne; the maintenance by the Duke of Buckingham. The estimated working expenses for the current year are £650, including 10 per cent. interest on two engines. The traffic receipts for 10 months, March to December, were over £1,000, but these do not afford very certain data, as they include a large amount of material for construction, and there were no through rates with other lines until July. The earnings for this year are estimated at about £1,350 or £1,400. The actual earnings to April 1 (three months)—

Goods and minerals	£244
Coaching traffic	50
Total	£294

The line is worked by one six-horse Aveling & Porter engine assisted by one horse for shunting. The engine making two double trips daily, and a third if necessary. A second engine of the same size is being built. The power is found to be amply sufficient; the rates are low upon agricultural produce, minerals, etc. London manure is brought at 1d. per ton per mile throughout. 500 or 600 tons of chalk have also been brought for manuring arable clay land. The speed is necessarily, from the circumstances of the line, frequent stoppages, and the power of engines, very low. Time allowed Brill to Quainton, including stoppages, one hour and five minutes. The actual running speed varies from four to eight miles per hour. It was not intended to carry passengers except persons with cattle, etc., and the workmen on the estate; but so many have sought to avail themselves of the accommodation, that the passenger carriage was borrowed, and put on in January, since which the numbers carried have been: 104 in January; 123 in February; 176 in March; 224 in April. The villages accommodated are: Westcott, about 150; Ashendon, about 300; Wotton, about 220; Dorton, about 180; Brill, about 1,400."

The Grant Locomotive Works at Paterson, N. J., discharged 100 men November 1, and are now running on three-quarter time. No new work is commenced, and the discharge of men will be continued unless new orders are received.

The Rogers Locomotive Works at Paterson now employ only one-third of the usual force, and have reduced wages about 10 per cent.

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Editorial Announcements.

Removals.—The Chicago office of the RAILROAD GAZETTE *has been removed to No. 77 Jackson street, opposite Third avenue.*

The New York office of the RAILROAD GAZETTE *is removed to Room 131, No. 73 Broadway, opposite the upper elevator landing.*

Correspondence.—We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

MECHANICAL DRAWING.

Some clever person has said that no man was ever known to object to a degree of theoretical knowledge of which he himself was the possessor; neither have we ever known a good draftsman to underestimate the value of a thorough knowledge of drawing, but we have known many who were entirely ignorant of the art in whose opinion the time and money spent in making drawings are wasted. There is something intangible about their value. After a locomotive is built, it is hard for many persons to see why it could not all have been done without drawings, or to understand what part they perform in the construction of the machine. A few years ago, when sleeping cars were not so common as they are now, the writer made the drawings for the construction of a number of new ones. Before work was commenced the plan of the car and all the details were carefully worked out in drawings. After they were completed, the person who was to have the care of them, and who supervised their construction, congratulated himself on his good luck that everything he said "came in just right," the fact being that "everything" was anticipated on paper, and the plans were carefully matured and things were made to "come just right."

The amount of loss and waste which attends the execution of important engineering or mechanical work for which the plans are not adequately developed and carefully drawn out in detail, no one can realize unless he has had an opportunity of seeing it. The blunders and mistakes always occur in the most unexpected places and ways. Material is ordered too long or too short, one part of the work will interfere with another, and there will be too much strength at one point and too little at another. All sorts of expedients must be resorted to in order to overcome what a few carefully-made drawings would have anticipated and provided for. Work must be thrown away and new parts provided, and in all such cases the person in charge of the work is taken by surprise at his bad luck, when the whole evil is the result of not carefully designing the structure before undertaking to build it. It is very much cheaper and easier to construct and alter the idea of a thing on paper, than it is to change it if once entirely or partly finished in wood or metal.

An experienced draftsman will also be able, in making his drawings, to devise the simplest and best method of doing work. If plans only half matured are submitted to workmen, more time will be wasted by them in determining how to do the other half than would be required by a person more accustomed to that kind of work in designing the whole. Nearly all foremen are familiar with the attitude of a perplexed blacksmith or machinist over an obscure drawing, trying to decipher its meaning or comprehend the construction of what he is called on to make; and the same foremen have doubtless had occasion to cut and try before they could "make things come right" in a machine whose plan was left vague and indefinite. The amount of work which a thoroughly competent and experienced draftsman will save in the construction of what he designs will always be greater than the cost of making the drawings.

The value, too, of preparing careful records of the work done is very great in a business of the magnitude to which the railroads of this country have grown. In most repair shops, for example, there has been from their commencement a continual change of managers. The man who succeeds his predecessor does not or cannot know what the latter did, or his reasons for doing it. It grows more and more important every year to adopt some system of standard sizes for those parts which constantly need renewal. Some time ago we had occasion to look over the replies sent by the master mechanics and master car-builders of the different roads to the committees appointed to determine the form and proportions for a standard car-axle. In a number of them the dimensions given by the car-builders differed from those given by the master mechanic, and in many cases it was obvious that neither of them knew the sizes of the axles they used on their road—the fact probably being that there was no drawing or pattern showing the sizes, and the whole matter was left to the man who turned and finished the axles. In such cases it is no unusual thing to find the dimensions of standard parts gradually undergoing a change. The person's memory being not infallible, he will drop a sixteenth of an inch at one place, and add an eighth somewhere else; or he will measure an old axle which is either worn or finished "scant," and he will thus lose that much in the "standard" size. A similar process of accretion often goes on in the weight of castings. At each breakage something is added to the size and amount of metal, until it reaches inordinate proportions. With standard drawings there is always something to refer to. If a new man is put to work on axles, he has his drawing to work to, and not an old tradition or myth to decipher, with no other evidence than that of old, shrunken patterns possibly, or worn axles. We have selected axles as a familiar example. The same thing occurs in many other parts. Take the flanges of wheels: probably few roads in the country have any really established standard for this very important part of rolling stock, and we have of late observed an obvious tendency to lessen the depth of flanges, which ought not to be done, at least not without its being known to those who determine such things, as it obviously is in many cases.

It is surprising, too, how the spirit, the taste and the good judgment of a draftsman will manifest itself in an establishment in which he wields his pencil. If he is fond of ornament, the machinery and buildings, or whatever comes under his influence, will gradually assume a sort of tropical luxuriance. If, on the contrary, he has that sound, practical sense which aims to adapt means to ends in the most direct and effective way, all that he designs will grow into the simplest forms and assume a sort of modesty in its design.

There is one trait, however, which a draftsman should aim to exercise, that is, prudence. Nothing injures his reputation so much as an experiment which fails. He ought to use every means to insure certainty in what he aims to accomplish. Never employ doubtful means or methods. Whenever it is possible, seek a precedent and study it to see what it teaches. Adopt, as far as possible, tried expedients and methods of construction, adapted, of course, in the most effective way to the ends in view. In other words, to finish with a little advice which is a quotation from our sleeping-car friend already referred to, in designing work "always figure so that heads you win, and tails you *don't* lose."

THE USE OF SAFETY CHAINS ON CAR-TRUCKS.

On another page we reprint the very excellent report of the committee on this subject made at the last convention of the Master Mechanics' Association. As most of our readers know, we have for several years past advocated the use of these attachments to all passenger cars. In urging their use we were, however, unable to do more than give the reasons which seemed to us amply sufficient to recommend them, and which ought to make their use imperative on all passenger cars, if not on those employed in carrying freight. Our reasons for advocating their use were met with the reply, from those who do not use them, that they "did not believe they did any good," that "the way they are put on they are no use," that "they would pull out the sills of cars and do more harm than good." Now, of course, after stating the reasons which to us seemed conclusive for using check or safety chains, there was little to be said in reply to such answers as the above, or very little more that we could do to convince those who have no faith in the efficacy of safety chains "in lessening the danger resulting from running off the track." Fortunately for the object we have in view, which is to make travel on railroads safer and reduce the risks to which human life is exposed, the report referred to gives us authority for urging anew that all passenger cars should be provided with safety chains. While some of our readers have not been able to see the force of the reasons which we have presented, and therefore may have felt justified in disregarding our recommendations, we doubt whether the public would hold them guiltless if an accident or loss of life should occur which by implication even could be attributed to the absence of safety chains on the car-trucks, when the testimony of nineteen out of twenty-four experienced master mechanics recommends their use in the most decided way, and, what is much more to the point, eighteen of them "reply that they know of a number of instances where the use of safety chains, in their opinion, was the means of preventing much destruction of property, and perhaps in some instances loss of life." Those expressing this opinion fortify it by citing "a number of instances coming under their observation" to sustain their views. That mentioned by Mr. L. H. Waugh, of the Kansas Pacific Railway, contains both positive and negative testimony. In the accident which he mentions the cars with safety chains were injured so little that they "continued on in the train to their destination," while the only car without these attachments "received so much damage that considerable repairs were required before it could be put in service again." It is perhaps to be regretted that the committee did not report all the instances mentioned in the replies they received, as it would have made the evidence much stronger. The committee also say in their report that "a great number of instances can be mentioned where safety chains have proved efficient; and when of proper strength but few instances can be shown where they have not been efficient in ordinary cases." It must be remembered that but twenty-four members of the Association replied to the inquiries of the committee, and that if the testimony of all could be procured doubtless the evidence in favor of safety chains would have been much stronger.

It should also be observed that those who do not believe that safety chains are "efficient in lessening danger," and, therefore, do not put them on their cars, are defending a negative position, which is very much like that of the man who was convicted of stealing an axe, on the testimony of three witnesses who saw him take it, and who asserted his innocence and proposed to prove it by bringing any number of witnesses who would swear they *did not* see him take it. We have here nineteen witnesses out of twenty-four who testify that they have seen property and perhaps life preserved by safety chains properly applied. That this evidence could be increased ten fold, if means were adopted to collect it, we have no doubt; but with that before us it will not be any sufficient excuse for neglecting to use them, because the person who refuses has "never seen that they were of any use." On the same ground we might refuse to use a safety-valve on a steam boiler because we never happened to see an explosion for want of one.

If need be, too, the committee having the matter in charge, and composed of some of the most intelligent, observant and clear-headed master mechanics in the country, after studying the question for a year, give as their opinion that "a great number of instances can be mentioned where safety chains have proved efficient; and, when of proper strength, but few instances can be shown where they have not been efficient in ordinary cases."

In the discussion after the report was read at the convention not a single member opposed the general use of safety-chains, and the discussion was closed by the adoption of a resolution recommending "the application of safety-chains to all engines, tenders and cars."

It will be observed that one member made the very pertinent inquiry whether "any one present knew of check chains tearing out sills?" No instance was mentioned, excepting that stated by a member of the committee, that he had seen cases where the sill was split from improper attachment of the chains.

We are endeavoring to express the substance of this

report and the conclusions of the Master Mechanics' Association on this subject as forcibly as we can, because many roads in this country are still running their passenger cars without safety chains to their trucks. Of the roads terminating in the city of New York, we know of but two on which such appliances are generally used. We believe that many accidents which have occurred would have been prevented, and in others there would have been much less loss of life, if check chains had been used. The melancholy accident a few years ago at New Hamburg, on the Hudson River road, would doubtless have been prevented if the freight car with the broken axle had been provided with strong check chains and the floor of the bridge had been made close and strong enough, as all bridge floors should be, so that a pair of wheels off the track could run across without breaking through, should it happen to get off the track. Mr. Waugh relates that *six cars* with safety chains on the Kansas Pacific ran across a bridge without injury. Another accident occurred on the Long Island road a few years ago where many lives were lost which would, we think, have been saved if the trucks had been held in line with the track after being thrown off by a broken rail. Doubtless practical railroad men could name many other similar instances, and we should be obliged to any of them for communicating them to us. By so doing they will aid us in calling attention and convincing others of the value of safety chains, and that they are what their name implies.

The Modulus of Elasticity.

The following inquiries are made by a correspondent:

"I write to you for information, since you must have a good library of reference.

"What I want to know is, what is the use of the "modulus of elasticity" in strength of materials, like wrought and cast iron and steel?

"How is it used, and why? How is it found?

"I have studied Rankine, pages 226 and 227, but cannot get much satisfaction. Now I see in Rankine, pages 510 to 514, that good bar-iron, for instance, has, ultimate tenacity, 60,000 lbs.; proof tenacity, 20,000 lbs.; ultimate extension, 0.200; modulus of elasticity, 29,000.000 lbs.

"Now, how is this 29,000,000 evolved out of this figure, and what avail is it when found? What does it indicate? If this modulus is not found by calculation, but by experiment, what is its value?

"My Byrne's 'Pocket Companion,' page 42, says of iron in bars: 'Extension at the limits of elasticity, 1-1520 (= .00063); modulus of elasticity, 29,902,306 lbs.; modulus of working strength, 20,622; modulus of strength, 59,805; modulus of safety, 10,311.' Now I still do not see the connection of the 29,902,306 lbs., if it is found from the others.

"To recapitulate, I want to know how the modulus of elasticity is found, and what good it does when found."

The co-efficient (or modulus) of elasticity is found (see Wood's Resistance of Materials, p. 4) by taking a bar whose section and length are unity and elongating it a small amount, and then dividing the force which produces the elongation by the amount of the elongation. We presume that other writers give substantially the same idea. We will therefore endeavor to make the subject more clear by expanding it. All materials may be elongated or compressed a small amount without damaging their elasticity. As all bodies are more or less elastic, every pulling or pushing force which is applied to them will cause them to be elongated or compressed. It is found by experiment that when elongated only a small amount (the extent of the elongation being determined by experiment) the elongations are proportional to the forces which produce the elongation. Thus, if a bar which is ten feet long is elongated .01 of an inch by a weight of 2,500 pounds, then 5,000 pounds will produce an elongation of .02 of an inch, and so on until the limit of elasticity is reached. If the quantities which are given in this example were those obtained from an actual experiment, we may find the co-efficient of elasticity for that bar. For if the elongation is .01 of an inch for a bar ten feet long, it will be $\frac{1}{100 \times 10 \times 12} = \frac{1}{12,000}$ of an inch for a bar one inch long. Dividing 2,500 pounds by 1-1200 gives 30,000,000 pounds for the co-efficient of elasticity, which is usually denoted by *E*. If the section was not a square inch, we would divide the result by the area in square inches.

Delicate experiments have been made upon a great variety of material, in which the straining force, the section and length of the pieces and the amount of elongation of the pieces were carefully measured, and from them the co-efficient of elasticity has been computed. The value given by our correspondent (29,000,000 lbs.) is a mean value for iron. For cast iron it ranges from 13,000,000 lbs. to 22,000,000 lbs. For steel it rises as high as 31,900,000 lbs. A table is given in the appendix to "Wood's Resistance of Materials."

"What good does it do when found?" It enables us to find the amount of deflection (or bending) of a beam under the action of a given load, although the formulæ for this case involve much more analysis than the preceding. When properly used it is really more important to the engineer than the ultimate strength.

"How is this 29,000,000 evolved out of those figures. It is not deducted from these figures. There is no known relation between the elasticity of materials and their tenacity. In determining the ultimate strength of materials it is necessary to far exceed the elastic limit. The proof of tenacity is taken *arbitrarily* at one-third of the ultimate tenacity, and the values which our correspondent has copied from Rankine are above the mean values, being for good bar iron.

The example taken from Byrne's "Pocket Companion" enables us to determine the load which will produce the greatest allowable extension. This co-efficient of elasticity is 29,902,306. Hence the load which will produce an extension of 0.00063 of its length is $29,702,306 \times \frac{1}{1520} = 19,015$ pounds per square inch. This ought to be considered as the modulus of working strength in this case. The modulus of safety, which is given as 10,311 lbs., is an arbitrary value, but is assumed by Byrne to be one-half the working strength.

Interest Payments on Railroad Bonds.

The following shows the amount and place of payment of interest due in November on the bonds of railroad companies, only those being given on which there is no default.

	Am'nt pay'ble.	Place of payment.
Albany & Susquehanna, Albany loan 6s	$27,990	New York.
" " 3d mortgage 7s	15,190	" "
Atlantic & Gulf:		
South Georgia & Florida 1st mortgage 7s	16,240	" "
" " 2d " 7s	7,000	" "
Atlantic & Pacific 2d mortgage gold 6s	38,130	" "
" " Central Division gold 6s	35 685	" "
Atlantic & St. Lawrence. Portland City 6s	23,610	Boston.
" " steri'g 3d mtg. gold 6s	17,825	London.
" " non-mtg. gold 6s	19,120	"
Cedar Rapids & Missouri River 7s (guaranteed by C. & N. W.)	81,620	New York.
Central of New Jersey 2d mortgage (now 1st) 7s	6,090	" "
Central of New Jersey convertible 7s	105,000	" "
Chicago & Alton sinking fund 7s	6,965	" "
Chicago, Burlington & Quincy:		
Carthage & Burlington 8s	24,000	" "
Chicago & Northwestern:		
Funded coupons, 2d mortgage, Chicago to Oshkosh 7s	26,250	" "
Galena & Chicago Union 2d mtg. 7s	32,830	" "
Chicago & Milwaukee 1st mtg 7s	13,615	" "
Winona & St. Peter 2d mtg. 7s	54,775	" "
Chicago, Rock Island & Pacific:		
Chicago & Southwestern gold 7s (guaranteed in currency)	175,000	" "
Cin., Hamilton & Dayton 1st mtg. 7s	43,750	" "
Cleveland, Col., Cin. & Ind. new 7s	77,490	" "
Cleveland & Pittsburgh 7s	43,820	" "
" " consol. sk'g. fund 7s	33,810	" "
Columbus & Indiana Central 2d mtg. 7s (guaranteed by Pa. R. R. Co.)	28,705	" "
Cumberland & Pennsylvania 2d mtg. 6s (guaranteed by Con. Coal Co.)	10,335	" "
Delaware, Lackawanna & Western:		
Lackawanna & Bloomsburg 2d mtg. extension 7s	7,000	" "
Denver Pacific gold 7s	87,500	" "
Denver & Rio Grande gold 7s	105,717	N.Y., London & Amsterdam.
Detroit & Milwaukee 1st mortgage 7s	87,50	New York.
" " 2d " 8s	40,000	" "
" " 2d funded coupon 7s	13,199	" "
Oakland & Ottawa sterling gold 6s	4,950	N.Y. and London.
" " dollar 7s	1,785	New York.
East Tennessee & Virginia 6s	4,920	" "
Eastern of Massachusetts, 6s of 1869	15,000	Boston.
Erie 1st mortgage 7s	86,275	New York.
Evansville & Crawfordsville 1st mtg. 7s	22,260	" "
Evansville, Terre Haute & Chicago 1st mortgage gold 7s	27,125	" "
Flint & Pere Marquette consolidated sinking fund 8s		" "
Flint & Pere Marquette Flint & Holly 10s	22 5 0	" "
Flushing & North Side 7s	28,875	" "
Great Western of Canada 6s, due Nov. 1, 1873	17,087	London.
Hackensack & New York Extension 7s	10,500	Jersey City.
Indianapolis & Vincennes 2d mortgage 6s (guaranteed by Pa. Co.)	43 500	New York.
Ionia & Lansing 2d mortgage 8s	3 240	" "
Jackson, Lansing & Saginaw 1st mortgage 8s	36,920	" "
Jeffersonville, Madison & Indianapolis:		
Indianapolis & Madison 7s	13,895	" "
Louisville Indorsed 6s	2,200	" "
Jersey City & Albany. Ridgefield Park 7s	10,500	" "
Lake Shore & Michigan Southern:		
Michigan Southern & Northern Ind. 1st mortgage 7s	183,960	" "
Michigan Southern 2d mortgage 7s	94 255	" "
Buffalo & Erie 7s of 1858	3 500	" "
Little Miami 1st mortgage 6s (guaranteed by Pa. R. R. Co.)	45,000	" "
Long Island:		
Glen Cove Branch 6s	4,500	" "
Louisville & Nashville:		
Lebanon Branch, Louisville loan 6s	6,750	Louisville.
Memphis Branch 1st mortgage 7s	3,220	"
Maine Central:		
Belfast & Moorehead Lake gold 6s	4,500	Belfast & Boston.
Marietta & Cincinnati:		
Second mortgage 7s	87,500	Baltimore.
Scioto & Hocking Valley 7s	10,500	"
Maryland & Delaware 1st mortgage 6s	25,500	Boston.
Memphis & Charleston 1st mortgage convertible 7s	45,255	New York.
Michigan Central:		
Consolidated 7s	245,000	" "
Michigan Air Line 1st mortgage 8s	8,000	" "
Kalamazoo & South Haven 1st mortgage guaranteed 8s	25,600	" "
Kalamazoo & South Haven 2d mortgage guaranteed 8s	2,800	" "
Milwaukee & St. Paul Eastern Division 8s	31,660	" "
Mississippi Central 1st mortgage 7s	47,390	" "
Missouri, Kansas & Texas:		
Booneville Bridge guaranteed gold 7s	35,090	" "
Moblie & Ohio:		
First mortgage sterling gold 6s	173,130	London.
Interest 8s	59 048	Mobile.
Sterling interest gold 6s	22,651	London.
Tennessee subsidy 1s. mortgage sterling gold 7s	2,197	N. Y. & London.
Morris & Essex 1st mortgage sinking fund 7s	175,000	New York.
Newark, Somerset & Straitsville 1st mortgage gold 7s (guar. by B. & O.)	28,000	" "
New Jersey West Line gold 7s	105,000	New York.
New Orleans, Jackson & Great Northern income 7s	70,000	" "
New York, Boston & Montreal 1st mortgage gold 7s	218,750	N. Y., London, Berlin & F'kfort
New York Central & Hudson River:		
Premium 6s	178 090	New York.
Buffalo & Niagara Falls stockholders 6s	2,280	" "
Railroad stock 6s	17,810	" "
Real estate 6s	4,960	" "
Hudson River 3d mortgage 7s	5 810	" "
Consolidated mortgage 7s	92,785	" "
New York, Providence & Boston extension 6s	8,750	" "
North Pennsylvania 2d mortgage 7s	52 272	Philadelphia.
Ohio & Mississippi sinking fund 7s	35,000	New York.
Oil Creek & Allegheny River consolidated 7s	38,500	Philadelphia.
Orange & Newark 1st mortgage 6s	19,110	New York.
Oswego & Rome 1st mortgage guaranteed 7s	12,250	" "
Oswego & Syracuse 7s	7,035	" "
Pacific of Missouri real estate 8s	32,000	" "
Pittsburgh, Fort Wayne & Chicago:		
First mortgage 7s (series E.)	30,625	" "
Second mortgage 7s (series L.)	30 100	" "
Bridge 7s	3,885	Philadelphia.
Portland & Ogdensburg, Eastern Division gold 6s	99,000	Boston.
Portland & Ogdensburg, Vermont Division gold 6s	69,000	N. Y. & Boston.
Port Royal gold 7s (guaranteed by Ga. R. R. Co	17 500	New York.
Pullman Palace Car Co quarterly 8s	60,000	" "
Rensselaer & Saratoga 1st mtg. cons'd 7s	67,375	" "
Richmond & Danville consolidated 6s	60,000	" "
Rutland equipment 7s	17,500	Boston.
Rutland new general mortgage 8s	60,000	"
St. Louis, Alton & Terre Haute 2d mortgage 7s (series D.)	49,000	New York.
St. Louis, Alton & Terre Haute 2d mortgage 7s (income)	66,500	" "
St. Louis & Iron Mountain 2d mtg. gold 7s	105,000	" "
St. Louis & Southeastern 1st mtg. gold 7s	113,750	" "
St. Louis, Vandalia & Terre Haute 2d mortgage 7s	91,000	" "
Sioux City & St. Paul land grant gold 7s	17,500	" "
" " " currency 8s	49,600	" "
South Side of Long Island 1st mort'ge 7s	78,750	" "
Sullivan & Erie 7s	35,000	" "
Toledo, Peoria & Warsaw consolidated 7s	52,500	" "
Toledo, Wabash & Western:		
Quincy & Toledo 7s	17,500	" "
Illinois & Southern Iowa 7s	10,500	" "
Toledo & Wabash 7s	35,000	" "
Wabash & Western 7s	22 500	" "
Great Western 7s	87 500	" "
Toledo & Wabash equipment 7s	21 000	" "
Hannibal & Naples 1st mortgage 7s	23 625	" "
Hanafial & Central Missouri 1st mortgage gold 7s	38,500	" "
Hannibal & Central Missouri 2d mtg. 7s	8,750	" "
Troy & Boston 3d mortgage 7s	22,750	" "
United New Jersey Railroad & Canal Co.:		
Camden & Amboy 6s (due 1889)	25,980	Princeton, N. J.
Vermont Central:		
Income and Extension 8s	40,240	Boston,
Vermont Central and Vermont & Canada 8s	80,000	"
Washington City, Virginia Midland & Great Southern:		
Orange & Alexandria 1st mortgage 6s	12,000	Baltimore.
" " 3d mortgage 8s	24,000	"
Total	$5,600,493	

The Railroads in Default.

We give below a list of the bonds whose half-yearly interest was due on the 1st of November and not paid. Of these the St. Louis & Southeastern promises to pay before the end of the month, and the Burlington, Cedar Rapids & Minnesota expects, we believe, to make payment soon. The list, perhaps, is not entirely complete, but we do not think that more than two or three other issues of bonds whose interest is due this month can be added to the number.

Coupons Due November 1 on which Default has been Made.

	Amount due.	Place of payment.
Burlington, Cedar Rapids & Minnesota gold 7s	$189,000	N. Y. or London.
Burlington & Southwestern 1st mortgage 8s	72,000	Boston.
Chesapeake & Ohio 1st mortgage gold 6s	45,000	New York.
Chicago & Michigan Lake Shore 6s of 1871	54,000	Boston.
Kansas Pacific:		
First mortgage land grant gold 7s	225,925	N. Y., London and Frankfort.
Leavenworth Bridge 7s	21,000	N. Y. & St. Louis.
Leavenworth, Lawrence & Galveston: Kansas City & Santa Fe 10s	36,0 0	Boston.
New York & Oswego Mid and:		
Second mortgage convertible 7s	87,500	New York.
" " non convertible 7s	52,500	" "
Peninsular of Michigan 1st mtg. gold 7s	97,205	" "
Port Huron & Lake Michigan 1st mortgage 7s	63 000	" "
St. Louis & St. Joseph 1st mtg. gold 6s	30,000	" "
St. Paul & Pacific:		
First mortgage main line land grant gold 7s	105,000	London.
Second mortgage main line land grant gold 7s	210,000	"
Union Pacific, Central Branch 1st mortgage gold 6	48,000	New York.
Total	$1,741,190	

Of this amount $1,457,925 is payable in gold, and adding 8 per cent. for the premium on gold, which would be $100,634, the currency requisite these payments is $1,841,824.

Some of these are old acquaintances. The Peninsular, Port Huron & Lake Michigan, St. Louis & St. Joseph and St. Paul & Pacific have not paid for some time, we believe. The Chicago & Michigan Lake Shore defaulted on an issue whose coupons were due in September; the Leavenworth, Lawrence & Galveston on its own bonds last July. The others, six in all, with a total of $1,149,925 due, all but $235,000 payable in gold, so that at 8 per cent. premium for gold the amount in currency would be about $1,220,000, are in default now for the first time.

This does not look well, it must be confessed, but we believe that the circumstances are such as to make these failures to meet engagements insufficient to prove that the several railroads are even now unprofitable properties, and certainly they will not justify the judgment that they will not hereafter do a profitable business and meet their engagements promptly. We do not say that they will all do so. Indeed, we do not think that much can be said for two or three of them; but even these, it seems to us, cannot be convicted by this

failure, which in ordinary circumstances and with completed roads would be sufficient proof that the roads had insufficient traffic to support them. But in this case, if we think a little, we will see that all but one of the companies were in the midst of large expenditures *on capital account*. Four were in progress of construction and could not possibly be made productive without further expenditures, large or small, and the fifth was constructing branch lines while its ordinary income was but just about sufficient to meet its coupons. While engaged in this work, therefore, the expense of which must necessarily be met by the sale of new securities, the condition of the money market for many months has been such as to make it impossible to sell any large amount of such securities. So those companies even which have considerable lengths of road open with a more or less profitable traffic have had to meet their maturing obligations for new construction from their income, as far as it would go, and when the day for paying the November coupons came around, they were found with empty treasuries. Much more is this the case with the roads whose traffic had hardly begun, and which in the natural course of things could hardly hope to earn their interest from their traffic. For these the natural and legitimate sources from which to pay interest are the sale of securities and assessments on the stockholders. Now in such a time as this neither of these resources is available. You cannot sell new bonds at any price, scarcely, and very few stockholders are able, if so disposed, to obtain money to pay assessments; for the average capitalist does not keep his wealth in currency locked up in a safe, but in securities or other property which can usually be readily sold, or on which, in ordinary times, money can be borrowed. But the Chesapeake & Ohio stockholder who ordinarily would be able to pay the assessment of $100,000 by the sale of Lake Shore or Michigan Central stock, now finds those securities shrunken a third in their market value, and other securities usually negotiable, hardly salable at all. As we have said before, all the roads named above and now in default, with exception of the Union Pacific Central Branch, have been engaged in the construction of new or renewal of old lines which they could not expect to pay for out of their income, they have properly depended on the sale of bonds in order to meet this cost, for some months such bonds have been comparatively unsalable, and the result is that they are left without the means to meet their obligations.

This, it should be remembered, is entirely separate from the question whether these new constructions were likely to prove profitable and were therefore advisable. Such a question needs a special investigation into each separate case, for which we have neither time nor space now.

The great default is that of the Chesapeake & Ohio. The leading stockholders of this company are very wealthy men, and it is understood that an effort was made to have them advance the money needed to pay the coupons. That it failed is not necessarily their fault, for with ever so great a disposition to pay money many wealthy men are unable to do so now. We cannot but feel, however, that it is exceedingly unfortunate that the effort did fail, for the bonds have been held in very high esteem, the agents are known as among the most honorable of American bankers, and the securities have been intimately associated in men's minds with those most held and favored abroad. When default is made in a security with such a reputation, it makes investors, and especially foreign investors, distrustful of all securities. "If these fail," say they, "then what can we trust?" The company has made a proposition to the holders of the first-mortgage bonds to fund this and the three following coupons in 7 per cent. income bonds which are to be accepted at 85. The holders of the 7 per cent. bonds are offered 7 per cent. income bonds for the face value of the coupons for the next three years. This would give the company time to develop its traffic.

The Kansas Pacific announces that it will continue to meet its floating obligations, and will resume the payment of its coupons "as soon as the company can realize upon either the first-mortgage bonds of its branch lines, or upon real-estate securities held by it." The earnings for the year it estimates as about $400,000 in excess of the interest on its funded debt.

The St. Louis & Southeastern has made no statement, and announces its intention to pay the coupons instead very soon, which will doubtless suit the bondholders best. It has had a growing traffic all the year, but it has had to largely equip and reconstruct its Nashville Division, which it bought last year.

The Burlington, Cedar Rapids & Minnesota has made no statement at this writing, but probably will have by the time this reaches our readers. We understand that it expects to pay its coupons soon.

We give elsewhere a table of the amounts of interest due this month which were paid (or we suppose to have been paid) at maturity. The amount, without distinguishing gold from currency, foots up $5,600,000. Then the defaults amount to the enormous proportion of 24 per cent. of the total due.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE has information of the laying of track on new railroads as follows:

Springfield, Athol & Northeastern.—Extended from Indian Orchard southwestward 6 miles to Springfield, Mass., completing the road. *Long Island.*—The *Flushing Branch* has been completed from Newtown northeastward 4 miles to Flushing, L. I. *Allegheny Valley.*—The *Eastern Extension* has been extended from Brookville eastward 21 miles to Summit Tunnel, Pa. *Grand Rapids & Indiana.*—Extended from Bear Creek northward 10 miles to Little Traverse Bay, Mich. *Burlington & Southwestern.*—Extended from Unionville, Mo., southward 6 miles. *Mississippi Central Extension.*—Extended from Milan, Tenn., northward 65 miles to Neville, Ky. *Eastern.*—The *Marblehead Branch* has been completed from Swampscott northeast 4 miles to Marblehead, Mass.

This is a total of 119 miles of new railroad, making 3,074½ miles completed in the United States in 1873.

The Government Boiler Tests.

The experiments by the government with steam boilers, of which we have spoken heretofore, will be begun at Sandy Hook Wednesday, November 5, and at Pittsburgh a week later. The preparations have been carefully made and are more extensive than was first expected. The boilers are in position at Sandy Hook, with all necessary instruments for making observations and a bomb proof 360 feet distant which will enable the observers to remain comparatively close to them during destructive tests. The Commission appointed to take charge of the work consists of Supervising Inspector Addison Low, of New York; C. W. Copeland, of New York; J. H. Robinson, of Boston; Supervising Inspector John Menshaw, of Baltimore; J. V. Holmes, of Ohio; Benjamin Crawford and Supervising Inspector John S. Devinney, of Pittsburgh.

The scope of the experiments may be seen by the following schedule:

First: Explosions caused by the gradual increase of steam pressure.
Second: Those caused by low water and overheating of the plates of the boiler.
Third: Those caused by deposit of sediment, or incrustation on the inner surface exposed to the fire.
Fourth: Those caused by the generation of explosive gasses within the boiler.
Fifth: Those caused by electrical action.
Sixth: Those caused by the percussive action of the water in case of rupture of boiler in the steam chamber—Clark & Colburn theory.
Seventh: Those caused by the water being deprived of its air.
Eighth: Those caused by the spheroidal condition of the water.
Ninth: Those caused by the repulsion of the water from the fire-surfaces or plates.

Congress appropriated $100,000 to defray the cost of these experiments, and great efforts are making to render them complete, record them accurately and secure trustworthy results.

A GREAT WHEAT CARGO was that recently shipped at San Francisco for Liverpool in the ship Three Brothers (late the steamer Vanderbilt of the United States Navy, and presented to the Government during the war by Commodore Vanderbilt, we believe). She has on board 4,393½ tons of grain, and if they are long tons, as we presume they are, this cargo amounts to 164,136 bushels, or 492 car-loads, which would make sixteen heavy trains. A hundred such cargoes would have carried away all the wheat received at New York in 1872, and more than the total wheat exports to Great Britain during that year, and little more than two hundred (208) would have carried away all the wheat received at the lake ports of Chicago, Milwaukee, Detroit and Toledo during the same period. Probably such a vessel can easily enough make six trips a year between Liverpool and New York or Montreal, so that we may say that a fleet of seventeen such vessels would have carried our entire wheat exports to Great Britain, and the cost of such a fleet could hardly be more than that of about 350 miles of average American railroad. For the railroad to carry so much, however, would not be very difficult, as it would necessitate the movement of only 150 car-loads daily, which would need only four, five or six trains, according to the grades, and these would not necessarily occupy the track more than an hour or two each day; but then the railroad would carry but 350 miles, while the fleet would carry 3,000.

NEW PUBLICATIONS.

Landscape Architecture as Applied to the Wants of the West. By H. W. S. Cleveland, Landscape Architect. (Chicago, Jansen, McClurg & Co.)

This little book contains two distinct essays, the first, of 80 pages, on the subject which has given the book its title; the other, of 53 pages, entitled "Forest Planting on the Great Plains."

"Landscape architecture" is not a commonly used term in this country, and Mr. Cleveland recognizes that fact, and in his preface says that he makes use of it in want of another which would express his meaning. Further on he gives this definition:

"Landscape gardening, or more properly landscape architecture, is the art of arranging land so as to adapt it most conveniently, economically and gracefully to any of the varied wants of civilization."

This is not the popular understanding of "landscape gardening," but Mr. Cleveland protests strongly against that definition, such as would confine his profession to the ornamentation of grounds simply. A chapter is devoted to a discussion of the inadequateness of the ordinary ideas of the art and of their frequently disastrous effects, as where the owner of a property, having irretrievably fixed the position of his buildings and perhaps made it forever impossible to utilize the full capacity of the grounds for use or beauty, comes to the landscape architect to ornament his estate.

The author considers the application of the art to private estates, towns and cities and parks and other pleasure grounds, and he does not so much attempt to show how anything should be done—except as an illustration to show the grievousness of prevailing errors—as dwell on the leading underlying principles and the great importance of applying them. He becomes very earnest in this, and urges the importance of due attention to artistic design in laying out the new towns and cities of the West with a warmth which shows that his heart is in the matter. As railroad companies in these days to a great extent determine the position and plan of new towns, they are (or should be) especially interested in Mr. Cleveland's suggestions. And, lest any might think that he looks upon the world as properly a great pleasure garden, where everything should be designed for pleasure of leisurely saunterers and pleasure-seekers, we may say that he recognizes that towns and grounds must be and should be made to serve as perfectly as possible the uses to which they are to be put, and that he claims as a large part of the value of his art its ability to make the best use, as well as the most beauty, of the surfaces and structures with which it deals.

The essay on "Forest Planting on the Great Plains" is an expansion of the paper entitled "Planting Trees on the Prairies," which was reprinted in these columns in March and April, 1871. It is of especial interest to railroad companies, and not to those with great estates in the Far West alone, for it shows the feasibility and profitableness of tree-planting along railroads wherever there are no trees. Its publication has been the cause, we believe, of the beginning of tree-planting on a large scale by several railroad companies, some of which have employed Mr. Cleveland to supervise the work. He loves trees as if they were children—and very pretty and well-mannered ones, for that matter—and writes of them tenderly and with the fullness of knowledge which comes of intimate knowledge long continued. This essay contains Mr. R. S. Elliott's report on the experiments in cultivation on the plains along the line of the Kansas & Pacific Railway, the circular issued by the Western Forest Tree and Hedge Growing Association of Kansas, and Mr. Chanute's circular concerning hedging the line of the Leavenworth, Lawrence & Galveston Railroad, and is worth studying by every man who manages a railroad through a treeless country.

Convention of the Technical Officers of the German Railroad Union, at Dresden, in August, 1865.

The following, which we translate from a number of the *Organ fur die Fortschritte des Eisenbahnwesens in technischer Beziehung* published in the fall of 1864, may serve to illustrate the method in which this Union, now more than twenty years old, conducts its business:

At the general convention of the German Railroad Union held at Salzburg, in August, 1864, on motion of the Royal Hanover General Directory of Railroads and Telegraphs, it was resolved that a convention of the technical officers of the German Railroad Union should be held again, as in the year 1850 in Berlin and in 1857 at Vienna, and the Technical Committee of the Union was charged with the preparations for this convention and also with the fixing of the time and place for it.

The Committee, at a conference held at Frankfort-on-the-Main on the 15th of July, in order to a fundamental preparation and the securing of solid results from the technical convention, which is to be held at Dresden in the second half of August, 1865, has passed the following resolutions:

1. A series of questions will be proposed by the Committee which will come under consideration at that convention, and these will be imparted as soon as possible through the managing directory of the German Railroad Union to each of the managements, and also published in the technical organ of the Union for the advancement of railroading.

2. These questions are such as make absolutely necessary, in order to answer them, extensive preparations, statistical information, etc., and necessitate a central comparison and treatment, and also those for which, although a treatment in writing is not absolutely necessary, yet the technical members at the convention will at least have to prepare themselves.

3. At the call of the managing directory, by which these questions are to be allotted, the managements of the railroads will be requested to have the treatment of all the questions where possible, but at least those of the first kind, made *to the close of the current year*, and sent in printed to the managing directory of the Union and all the technical committees belonging to it.

4. These materials will be examined by the members of the Technical Committee with reference to the preparation of a report, and at a sitting of the Committee to be held in January after a preliminary discussion reporters for the separate questions will be appointed from their body, or other managements will be invited to undertake the preparation of the report through their own technical officers for the approaching technical convention.

5. The Technical Committee will convene with the technical officers of other managements which may have undertaken the preparation of a report in May, 1865, in order to consider thoroughly the results of their labors and decide upon the report for the convention.

6. The reports will be distributed before the technical convention and communicated through the Managing Directory to all the railroad managements in the Union as the result of the labors up to that time, in order that the technical officers may have opportunity to examine the same before the general convention, and be able to complete them whenever requisite.

7. At the convention the questions will be considered either in two separate sections
a, of the engineers of construction.
b, of the engineers of machinery,
or, so far as may seem requisite, in the general conference.

8. In order that all the railroad managements may have opportunity to bring before the technical conference for consideration any subjects desired by them, they will be invited, in the circular to be prepared by the managing directory with which the questions proposed by the Technical Committee will be sent, to send in such subjects to the managing directory until the end of September of the current year, and this directory will turn over the questions to the Technical Committee for preparation for the convention. Should appropriate questions be suggested in this way, these also will be arranged and imparted to the different managements in time before the convention, and, finally, reporters will be appointed for these also, who will make the preliminary report at the technical convention.

Besides a revision of the articles of association, the safety ordinances, and certain regulations for through traffic, by the resolution of the Technical Committee the following questions

have been proposed for the action of the technical convention at Dresden:

A.—Railroad Construction.

1. How great is the average duration of sleepers according to experience up to this time, and, especially,

a, of oak, beech, pine and fir ties which are not impregnated.

d, of ties of the four kinds of wood named which have been prepared according to the different methods of impregnation.

In the treatment of this question, which is to be discussed in writing, information in a tabular form is to be adduced concerning the actual number and proportion of the ties renewed on each road since its opening for traffic, and in this especially the cause of abnormal circumstances affecting any unusually short or long duration are to be explained.

2. How great is the cost of impregnating the ties according to the different methods and the kinds of timber, on a rough average, including interest and the maintenance of the plant for impregnation?

3. What method of impregnation deserves preference, considering its results and its cost, according to experience up to this time?

4. What is to be accepted as the life of the rails which have been used heretofore, according to previous experiences, on roads with a medium traffic? with a statement of the approximate number of trains per day for the different periods of time, and, where possible, of the loads carried by them.

5. What weight and what height of rails is to be recognized as the least allowable, in view of the continually increasing weight of locomotives and cars, and as advisable; and, according to experiences and prices hitherto, is it already judged advisable to try experiments on a larger scale on the open road* with steel-topped rails or rails wholly of steel?

6. What are the experiences with the omission of chairs under the rail joints, which has come more into use recently, and the placing of the fished joints between two ties?

7. What are the latest profiles and joint fastenings of each one of the German railroads? It is requested that drawings of the full size of the profiles and joint fastenings be supplied, accompanied by the weights of the rails and the parts of the fastening.

8. What has been the experience with superstructure on stone sleepers, and does it appear advisable, when stone material is cheap enough, to make trials with this mode of construction, which formerly seems almost universally to have been decided to be unadvisable?

9. What experiments have been made hitherto with the iron superstructure without wooden ties and stone sleepers, which has been much spoken of recently, and does it appear advisable to make serious experiments with this plan? What plan of construction is preferable to recommend for such trials?

10. What have been the experiences in the use of cast-steel switch rails and frogs, and also of case-hardened frogs, and are these materials to be recommended for general use for switches on main lines?

11. What construction of turn-outs without sunken track deserves the preference?

12. What have been the best results hitherto obtained, through practice and advanced theory, in the construction of iron bridges?

The railroads are requested to send in a comparison, as complete as possible, of the superstructures of new iron bridges completed, according to their clear span, system of construction, weight and cost, in the tabular form inclosed.

13. What are the opinions concerning the design and arrangement of secondary roads, which sooner or later will have to be brought to completion in neighborhoods where only a small traffic is to be expected, where they, on account of their design or direction, cannot possibly be made parts of lines of greater traffic?

B.—Locomotives and Cars.

1. What weights of car-loads are to be recommended as most judicious with cars of modern construction?

2. What dimensions of axles and their journals are to be accepted for renewals, according to the present state of experience, for the different weights of loads and axle materials?

3. What dimensions and arrangements should be given to covered freight cars in order to render them most fit as well for the transportation of merchandise as of horses during the movement of troops, and is it still requisite to the satisfactory arrangement of such a car for the transportation of horses to keep special horse-box cars?

4. Is it necessary or advisable to have the seats of brakemen wholly under cover?

5. On what roads is the patent screw coupling already introduced, and is it advisable to use the patent screw coupling on new cars for freight traffic, and to endeavor to have this method of coupling introduced generally for freight cars instead of the chain coupling?

6. Are safety chains on cars necessary henceforth, or considered desirable, and finally, what arrangement and strength should be given to them?

7. What system of construction of the journal boxes of axles deserves preference according to experience hitherto?

8. What are the maximum weights for locomotives and on each of their wheels which should not be exceeded?

9. What dimensions should be recommended for wrought-iron and cast-steel axles of locomotives and tenders?

10. What has been the experience in roofing the stand of the engine-driver, and is it necessary or advisable to adopt generally the sheltering of the foot-board?

11. What material should be especially recommended for the boiler tubes of locomotives, and what thickness is most advantageous with the different materials?

12. What construction of spark-arresters is most to be recommended, with regard to the different fuels?

13. What has been the experience with smoke-burning apparatus adapted to the use of coal?

14. What has been the experience with cast-steel wheels, axles and tires, and with case-hardened wheels for locomotives, tenders and cars?

15. Is it advisable to introduce generally on locomotives one of the various methods of condensation?

16. What experiments have been made in practice with the steam-injector?

17. What has been the experience with iron fire-boxes and boilers of steel plates?

19. What means are to be recommended for protecting the smoke jacket against rust, when firing with coal and using a steam jet?

19. What experiments have been made concerning the maximum distance between the axles of locomotives and cars?

C.—Signalling.

1. What system of construction of electro-magnetic telegraph apparatus deserves the preference for railroad service?

2. Should the introduction of the electric bell apparatus be prescribed as necessary or advisable, and should optical signals be maintained together with the bell apparatus?

3. Is it advisable to introduce the same colors universally for optical signals, and as follows: *red* for stop, *green* for caution, *white* for all right; and how far is the general introduction of a uniform signal system on all the railroads of the Union necessary or desirable?

4. After the introduction of the electric-bell apparatus should the signaling of extra trains by the preceding train be prescribed as necessary?

Signed by

Stummer, Klingel, Reuter, Hahner, Hesekiel, Spielhagen, Umpfenback, Thomas, W. Bender, Brandt, Klein, Lent, Funk.

* That is, not at station or on sidings.—Translator.

Contributions.

Defective Joints.

New Brighton, Pa., October 28, 1873.

To the Editor of the Railroad Gazette:

Reading "Observer's" article in your issue of 18th inst., it reminded me of a count of defective joints that I made on about half a mile of double track (being the distance from the station to our office) of the —— —— Railway a few days ago, just after the section-men had been over it and *lined up* all the joints. The result was: 96 joints with one bolt missing; 11 joints with two bolts missing; three of the joints with two bolts gone from one rail; the rest had one bolt from each rail missing. I made no count of loose bolts, of which there was quite a number.

The road-bed is almost level, and ballasted with a good quality of gravel. The joints are all of the usual pattern of fish-joint. About 25 to 30 trains pass over the road each way every twenty-four hours. There has never been a train off this portion of the track in the last seven years, except at switch. Being in town, where trains are limited to a certain speed, may have something to do with it, but as a general rule night trains pay but little attention to the speed limitation. W——.

The Report of the Board of Engineer Officers on the St. Louis Bridge.

To the Editor of the Railroad Gazette:

This document, published in the Gazette of October 25, seems to be open to considerable criticism.

That three intelligent, educated (even at West Point) men could be found who could seriously recommend the construction of a canal around the east end of the eastern abutment, to be crossed by a drawbridge, is a matter of astonishment to the profession, on the following grounds:

1st. The enormous cost of such a canal. See detailed estimate.

2d. The inconvenience of a draw in a double-track road already constructed to carry the business of ten railroads, now running over 250 trains, besides a carriage roadway with more than 1,000 teams a day.

3d. The ease with which even an ocean steamer could be steered through a space of 174 feet.

4th. The small number of boats requiring to have even 75 feet clear height.

5th. The fact that "city directrix" has only been reached once in 16 years, and that when it is, no landing of steamers is possible, owing to the conformation of the levee, and that the town of East St. Louis is eight feet under water. Even in the high water of the present year, at no time was there less then 70 feet under the center of the arch.

6th. The ease with which the upper 20 or 30 feet of a boat's stack can be lowered and raised by machinery, at an outlay of say $500 per boat for the apparatus.

7th. The small number of boats which trade both above and below the city at high water.

8th. The absolute impossibility of the larger boats passing through the canal recommended by the board, and the necessity of a larger one.

9th. The fact that it would take three years before such cana could be used by any boat; and by that time all the boats will have movable chimneys, and the pilots will have obtained the needed skill to pass between piers 500 feet apart in nearly the center of the span.

10. The notorious waste of fuel and steam in the river boats, which renders the size of the stacks at present necessary; when the steam is allowed to exhaust at 25 lbs. pressure and the gas from the furnace is hot enough to burn at the top of the stacks, it looks as if a reform in river engineering was needed more than anything else.

The estimate given was prepared by Colonel Flad, and after careful examination and familiarity with local prices, the only fault we can find with it is that it seems about 25 per cent. too low; and if the work should be done by the government it would probably cost $10,000,000 instead of $3,000,000. The weight of the draw was estimated by two engineers, without connivance, and the agreement was remarkable.

Estimate of cost of canal.

Taking down approaches	$50,000
Draw pier caisson	20,000
Draw pier masonry, 12,000 yards stone } Draw pier masonry 600 yards concrete }	222,000
Land damages, 1,000 feet of levee @ $400	400,000
Tower pier.	
Excavation	2,000
Piling	6,750
Concrete	5,000
Rubble	26,000
Cut stone	35,000
Retaining wall (stone on caissons) (56 feet high, 16 feet at base, 7 feet at top), 1,000 lineal feet @ $700	700,000
Excavation of canal	55,000
A parallel dyke on west side canal.	
Large stones 15,000 yards @ $4	60,000
Small stones, 10,000 yards @ $1.50	15,000
Draw bridge.	
1,160,000 lbs., wrought iron @ 15c	174,000
200,000 lbs. cast iron @ 10c	20,000
120,000 ft. B. M. Timber @ 7c	8,400
Engines and boilers	20,000
Repairing levee	12,500
Amount	$2,465,650
15 per cent for engineering and contingencies on all but land damages	329,847
	$2,795,497
Attendance of draw and dredging } Capitalized	270,000
	$3,065,427
Loss of revenue to Bridge Co. additional	$2,000,000

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—The following officers were chosen by the Grand International Division of the Brotherhood of Locomotive Engineers at its recent session in Philadelphia: First Grand Engineer, T. S. Ingram, Division No. 7, Lafayette, Ind.; Second Grand Engineer, Robert Pearson, Division No. 70, Toronto, Ont.; First Grand Assistant Engineer (Secretary), L. B. Greene, Division No. 85, St. Albans, Vt.; Second Grand Assistant Engineer, P. M. Arthur, Division No. 46, Albany, New York; Third Grand Assistant Engineer, J. E. Becton, Division No. 99, Water Valley, Miss.; Grand Guide, G. W. Johnson, Division No. 181, San Francisco, Cal.; Grand Chaplain, G. W. Tyre, Division No. 11, Indianapolis Ind.; Trustee of the Charity Fund (to serve five years, one being elected each year) William O'Neill, Division No. 41, Elmira, N. Y. Mr. Charles Wilson remains Grand Chief Engineer, his term not having expired. The Grand Chief Engineer, First Grand Engineer and First Grand Assistant Engineer will reside at Cleveland, O.

—At the annual meeting of the Camden & Atlantic Railroad Company in Camden, N. J., October 23, the following directors were elected: Andrew K. Hay, Winslow, N. J.; Samuel Richards, Ateo, N. J.; C. R. Colwell, Weymouth, N. J.; E. A. Doughty, Absecom, N. J.; J. R. Dayton, S. C. Cooper, Thomas H. Dudley, Camden, N. J.; W. D. Bell, John Lucas, C. Cambios, Jr., J. S. Newbold, Anthony T. Antelo, W. Massey, Philadelphia. Messrs. Dudley, Massey and Cooper are new directors, replacing Robert Frazer, Charles F. Davenport and John F. Starr. The board elected Andrew K. Hay President, in place of Robert Frazer, and re-elected D. M. Zimmerman, of Camden, N. J., Secretary and Treasurer.

—At the annual meeting of the Hannibal & St. Joseph Railroad Company at Hannibal, Mo., November 3, about 84,000 shares were voted on and the following directors were elected: John B. Drake, Chicago; Charles C. Low, J. P. Acker, New York.

—The directors of the new Concord & Claremont Railroad Company, formed by the consolidation of the Concord & Claremont, the Sugar River and the Contoocook River companies, met in Concord, N. H., November 3, and organized by electing Onslow Stearns President and Josiah Minot, of Concord, Treasurer.

—Mr. Jacob H. Swenk has been appointed Chief Train Dispatcher of the Sunbury Division of the Philadelphia & Erie Railroad.

—Mr. W. S. Spiers has been appointed Assistant General Freight Agent of the Toledo, Peoria & Warsaw Railway.

—Mr. J. F. Merrill, of Chicago, formerly Chief Engineer of the Sheboygan & Fond du Lac Railroad, has been appointed Chief Engineer of the Milwaukee & St. Louis Air Line Railroad.

—Mr. H. C. Lockwood, of Troy, Vt., has been appointed Treasurer of the Central Vermont Railroad Company.

—Major J. C. Hamilton has been appointed Northwestern Agent of the Red Line Transit Company, with headquarters at St. Paul, Minn.

—Mr. John H. Sullivan, Superintendent of the Minnesota Division of the Northern Pacific Railroad, has been appointed Superintendent of the Dakota Division also. He assumed charge of the Dakota Division November 1.

—The name of the new Supervisor of Rolling Stock of the Erie Railway, whose appointment was noted last week, should have been Mr. David Holtz, instead of Holz, as printed.

—Mr. William Moffet has been appointed General Foreman of the Car Department of the Erie Railway at Elmira, N. Y., in place of W. E Rutter, resigned. Mr. W. E. Cooper has been appointed General Foreman of the Car Department at Hornellsville, N. Y., in place of N. D. Ogden.

—The first board of directors of the Texas, Mississippi River & Northwestern Railroad Company, formed by the consolidation of the Little Rock, Pine Bluff & New Orleans and the Mississippi, Ouachita and Red River companies, is as follows: Powell Clayton, J. E. Sickels, A. H. Ryan, B. W. Martin, G. P. C. Rumbough, S. W. Mallory, O. P. Snyder, A. Hemingway, J. M. Clayton, of Arkansas: J. C. Smith, D. B. Sickles, New York; A. O. Morgan, Massachusetts. The officers of the company are: President, Powell Clayton; Treasurer, J. E. Sickels; Secretary, A. H. Ryan. For the present, Col. A. H. Ryan will have immediate charge of the roads as General Manager.

—Mr. Leander Garey, long Master Car-Builder of the New York & Harlem, has been placed in charge of the Car Department of the New York Central & Hudson River and the New York & Harlem railroads.

—It is reported that Mr. George H. Burrows, formerly Superintendent of the Niagara Falls Division of the New York Central and now Superintendent of the Toledo, Wabash & Western, will be appointed Superintendent of the Middle Division of the New York Central & Hudson River, in place of the late W. G. Lapham.

—At the annual meeting of the Detroit, Eel River & Illinois Railroad Company at Columbia City, Ind., recently, the following directors were elected: James A. Collins, Columbia City, Ind.; J. L. Davis, Van Buren, Ind.; D. D. Dykman, George E.

Adams, Logansport, Ind.; D. L. Quirk, E. F. Uhl, Ypsilanti, Mich.; James F. Joy, Allen Sheldon, C. H. Buhl, T. D. Buhl, Detroit, Mich.; W. W. Crapo, New Bedford, Mass. Messrs. Dykman, Uhl and T. D. Buhl are new directors, replacing Messrs. H. P. Baldwin, Elijah Smith and C. Haldeman.

—Mr. John C. Fowler, late a conductor on the New York, Oswego & Midland road, has resigned to accept a position in the construction department of the New York, Boston & Montreal.

PERSONAL.

—Mr. John B. Watkins, Superintendent of the Iowa Division of the Chicago & Northwestern Railway, was killed by a collision on his division, three miles west of Cedar Rapids, Iowa, early in the morning of the 30th ult., having been caught and nearly cut in two between the director's car and a Pullman car while descending the steps from the platform, which was broken off by the shock. The chief officers of the company were in the car which he was leaving. Mr. Watkins had been Superintendent of the Iowa Division, or one of the Iowa divisions when there were two, for several years, and about ten years ago was General Agent of the Chicago, Burlington & Quincy Railroad at Aurora, Ill., and in that place he was buried November 1.

—Mr. F. B. Gowen, President of the Philadelphia & Reading Railroad Company, fell and dislocated his shoulder while running on the Lackawanna & Bloomsburg road on his special engine, "Ariel."

—Mr. E. L. Dudley, Superintendent of the Southern Division of the Cairo & Fulton Railroad, was married recently to a Miss White, of St. Louis.

—Mr. William Parker, long a director of the Boston & Worcester Railroad Company, died in Boston, Mass., October 29.

—Mr. C. A. Smith, Master Car-Builder of the Erie Railway at Jersey City, N. J., resigned his position October 31. Mr. W. E. Rutter, Master Car-Builder at Elmira, N. Y., and Mr. N. D. Ogden, Master Car-Builder at Hornellsville, resigned their positions at the same time.

—Mr. F. W. Bowen, Superintendent of the Sacramento and Oregon divisions of the Central Pacific Railroad, has resigned his position.

—The Sacramento (Cal.) *Record* says that Mr. Charles Crocker, who is shortly expected to return home, will resume his position as Second Vice-President of the Central Pacific Railroad Company. Mr. Crocker will shortly go to Japan and China and thence to Europe on the business of the company. His object will be to inquire into the condition of commerce in China and Japan, with a view to the development of the traffic with those countries. In Europe his object is to ascertain the best method of attracting travel and immigration to California.

—Mr. W. E. Main, General Freight Agent of the Toledo, Peoria & Warsaw Railway, has taken a vacation and gone to California for the benefit of his health.

—It is stated that Mr. W. R. Woodard, General Superintendent of the Missouri, Kansas & Texas Railway, is about to resign his position.

TRAFFIC AND EARNINGS.

—The earnings of the Great Western Railway of Canada for the week ending October 10 were: 1873, £24,873; 1872, £28,252; decrease, £3,379, or 12 per cent.

—The earnings of the Grand Trunk Railway of Canada for the week ending October 11 were: 1873, £48,400; 1872, £43,400; increase, £5,000, or 11½ per cent.

—The earnings of the Erie Railway for the third week in October were: 1873, $483,247; 1872, $467,000; increase, $16,247, or 3½ per cent.

—The earnings of the Denver & Rio Grande Railway for the third week in October were: passengers, $3,922.80; freight, $4,277.72; mails, $123; express and miscellaneous, $79: total, $8,402.52; total, 1872, $6,488.67; increase, $1,913.85, or 29½ per cent. The earnings in 1873 include $258.82 for transportation of troops, mails and government freight.

—The receipts of grain and flour at Buffalo for the month of October were as follows, the flour being reduced to bushels of wheat: by Lake and Grand Trunk road, 1873, 13,713,261 bushels; 1872, 11,673,802 bushels; increase, 2,039,459 bushels, or 17½ per cent. By Lake Shore & Michigan Southern road, 1873, 2,559,700 bushels; 1872, 3,260,300 bushels; decrease, 700,600 bushels, or 21½ per cent. For the ten months ending October 21, the receipts were: by Lake and Grand Trunk road, 1873, 62,704,311 bushels; 1872, 54,354,973; increase, 8,349,338 bushels, or 15½ per cent. By Lake Shore & Michigan Southern, 1873, 25,664,100 bushels; 1872, 25,236,455 bushels; increase, 427,645 bushels, or 1½ per cent.

—The shipments of grain eastward by rail from Buffalo for the ten months ending October 31 were as follows: 1873, 25,676,198 bushels; 1872, 25,688,769 bushels; decrease, 12,571 bushels. Of the shipments in 1873, 5,763,000 bushels were wheat, 10,587,000 bushels corn and 8,761,000 bushels oats. The shipments east by canal from the opening of navigation to October 31 were: 1873, 44,753,924 bushels; 1872, 41,605,564 bushels; increase, 3,148,360 bushels, or 7½ per cent. Of the shipments in 1873, 21,713,000 bushels were wheat, 19,445,000 bushels corn, and 2,578,000 bushels oats.

—The receipts of canal tolls on the Erie Canal at Buffalo, from the opening of navigation up to October 31, were: 1873, $1,277,486.91; 1872, $1,239,097.40; increase, $38,389.51, or 3½ per cent. The number of boats cleared in 1873 was 8,132, against 7,581 in 1872.

—The earnings of the Great Western Railway of Canada for the week ending October 17 were: 1873, £25,695; 1872, £26,360; decrease, £665, or 2½ per cent.

—The earnings of the Grand Trunk Railway of Canada for the week ending October 18 were: 1873, £46,500; 1872, £40,400; increase, £6,100, or 15½ per cent.

—The earnings of the St. Louis & Iron Mountain Railroad for the third week in October were: 1873, $47,338; 1872, $45,719; increase, $1,619, or 3½ per cent.

—The earnings of the St. Louis & Southeastern Railway for the third week in September were: 1873, St. Louis Division, $19,097.40; Nashville Division, $10,494.99; total, $29,592.39; 1872, total, $26,848 55; increase, $2,743.84, or 10¼ per cent.

—The earnings of the Kansas Pacific Railway for the third week in October were: passengers, $28,669.96; freight, $49,370.25; mails, $2,055.31; total, $80,095.52. Of this amount, $3,740.53 was for transportation of troops, mails and Government freight.

CHICAGO RAILROAD NEWS.

Illinois Central.

The new transfer boat of this company is completed and will be brought down to Cairo this week. It is 200 feet in length by 45 in width, or 70½ feet wide over all, with a depth of hold equal to seven feet and eight inches. It is provided with a double track, and is capable of transferring 12 loaded freight cars at once. It is believed to be the finest transfer boat on the Western rivers. It will be put into the business of transferring as soon as the track of the Mississippi Central shall have been completed to a point opposite Cairo, which is expected to take place about the middle of the present month. The boat is capable of transferring within ten hours 125 loaded cars either way. Two weeks, therefore, will probably find the Illinois Central with a line of through freight and passenger cars in operation between this city and New Orleans. The change of gauge will be provided for by changing the trucks under the cars, as is successfully done in several places on the Continent. A line of through passenger cars between Chicago and Baltimore and Washington has just been established by way of Kankakee, Indianapolis and the Baltimore & Ohio road.

On the 2d the winter time-table went into effect, the chief change being in the morning train, which leaves Chicago at 8:15 instead of 8:25, and the Gilman passenger, which leaves at 4:30 instead of 5:15.

Chicago & Northwestern.

The La Crosse (Wis.) *Republican*, of October 25, says:

"Messrs. Losey, Paul, Kittridge and Seymour arrived in La Crosse this morning from Chicago, where a conference was yesterday held between those gentlemen and Col. Thompson and Mr. Taylor of the La Crosse Transit & Bridge Company, and Messrs. Keep and Howe, President and Manager of the Chicago & Northwestern Railway Company.

"Without unduly raising expectations in regard to the construction of the bridge and the Northwestern at La Crosse, we may be permitted to state as a result of the conference, that Mr. Kimball, Engineer of the Chicago & Northwestern Railway Company, will on Monday, 27th of October, meet Mr. Kittridge here, and begin an accurate survey of the line from the 'Junction' into La Crosse, with reference to its precise location; and as soon as the correct estimates of the work can be made and the route definitely fixed, it will be put under contract for completion by July next, if the right of way and depot grounds are secured by the city of La Crosse as hitherto offered, free to that company. This will enable the Bridge Company and the Northwestern Company to move simultaneously with their work."

This proposed branch from Winona Junction to La Crosse would be about four miles long.

Lake Shore & Michigan Southern.

A change of time has been made in the movement of passenger trains on this road, as follows, the new schedule having gone into effect Monday, November 3: The morning mail train leaves at 6:10 a. m.; the special New York day express leaves at 8:30 a. m.; the Atlantic express leaves at 5:15 p. m., and the night express at 10:20 p. m.

Chicago & Alton.

This company is to be congratulated upon the near approach of the completion of the bridge at Louisiana. All the masonry is completed and the staging is about all up. The contractor estimates that, with good weather, he will have the structure ready for business by the first day of December—certainly, under any circumstances, as soon as the tenth of that month; the second track is in operation as far as Summit, and a great part of the grading and bridging is completed to Wilmington, and track is being laid between Lemont and Joliet. The double track is to be completed to the latter city this fall, if possible.

The total amount paid by this company as damages on account of the Lemont collision will be more than $125,000, which is more than 1 per cent. on the company's stock.

Chicago, Danville & Vincennes.

Trains commenced, on Monday, November 3, to run from the new depot, corner of Clinton and Carroll streets, leaving at 7:35 a. m., and 6:30 p. m.

Freight Train Thieves.

A gang of thieves seems to have been organized in this vicinity to carry on thievery upon the several railroads that center in this city. A few days since, a gang, which had infested the Pittsburgh, Fort Wayne & Chicago freight trains, and had stolen to the amount of between $30,000 and $40,000 worth of goods, was supposed to have been broken up and the parties arrested, but through delays and legal strategy the arrested persons have been discharged, as railroad men fear, to resume their nefarious business. The Chicago, Rock Island & Pacific has been, and still continues to be, a sufferer from the thieves, who are so skilful as to successfully cover their tracks. Other companies have suffered in a similar manner. It is to hoped that some way may soon be found for the discovery of the robbers, and that a proper degree of punishment may be meted out to them.

THE SCRAP HEAP.

Railroad Manufactures.

The Passaic Rolling Mill at Paterson, N. J., has a full force at work, and its list of orders is as full as usual.

The Paterson Iron Company at Paterson, which manufactures locomotive and car axles, as well as the heaviest class of forgings, has 100 men at work, with a fair prospect of work through the winter.

The Watson Manufacturing Company at Paterson has contracts enough on hand to keep the full force of 500 men at work for some time to come.

The Jacksonville (Ill.) Car Works is now in full operation, and is working on a contract for the Jacksonville, Northwestern & Southeastern Railroad.

The Piqua Car Works, at Piqua, O., which employs some 300 men, has reduced wages 15 per cent.

The Columbus (O.) Rolling Mill is working full time, having some heavy contracts made previous to the panic.

The Danforth Locomotive Works at Paterson, N. J., has closed for a week to take stock. It is expected that work will be resumed next week.

The Norris Iron Company at Norristown, Pa., is furnishing the heavy castings for the engines of the Philadelphia & Reading Company's new steam colliers.

The rail mill of the Pennsylvania Iron Works at Danville, Pa., has been closed on account of want of new orders.

The Phœnix Iron Company at Phœnixville, Pa., has a new mill, 628 feet long, 288 feet wide and 30 feet to the eaves, just under roof. The company has been reducing wages about 10 per cent.

The Phœnixville Bridge Works has received a contract for a new bridge to replace the old chain bridge over the Potomac near the Little Falls, above Georgetown, D. C. The bridge will have eight spans, six of 172 feet each, and two of 160 feet.

The Co-operative Car Works at Oxford, Pa., continues at work, although no large orders have been received.

The Wason Car Company at Springfield, Mass., has reduced its force somewhat and is running eight hours a day.

The Cummings Car Works.

The Cummings Car Works at West Bergen, N. J., were recently obliged to suspend payment. The principal cause of the suspension was the failure of the New York & Oswego Midland Company to pay for a number of cars built for them. These cars, however, are still the property of the Car Company, and it is expected that arrangements will be made with the Receiver of the road for the payment of rent for their use. The company has also a number of cars on hand which have been ordered by railroad companies now unable to pay for them. Mr. W. H. Craddock has been appointed Receiver, but the company expects to be able to resume shortly. The assets are stated at $293,467.14, and the liabilities at $244,022 83, of which $94,200 is on account of capital stock. The company has also indorsed paper to the amount of $54,000 for various railroad companies.

Long Train.

The Boston *Advertiser* of October 3 says:

"The locomotive North Bridgewater on Thursday took a train of 144 freight cars over the Old Colony Railroad on their southern trip. This is the longest ever seen upon the road, being a third of a mile in length."

If the train was only a third of a mile long, the cars must have been only about 12 feet long from buffer to buffer, and if the cars were of the usual length, the train must have been nearly a mile long.

Shipment of Steam Gauges to England.

Messrs. R. H. Norris & Co., of Paterson, N. J., recently shipped a case of steam gauges of their manufacture to England. These gauges were made specially for the English market, and were handsomely finished. The manufacturers state that these are the first steam gauges ever imported to England. They claim that with their present improved machinery and facilities for manufacturing they can undersell the English manufacturers in their own market.

The Iron Market.

Iron (London, October 18) says: "Universal firmness in the iron market has been the first result of Mr. Kettle's award. [By which differences between iron masters and their employees in the North of England were settled.] Orders long held back, in anticipation of a fall, have at last been reluctantly doled out, and all hope of a drop of prices during the present year has been finally relinquished." Coal is no cheaper and there is talk of raising prices in some quarters. In Scotland, 10 shillings per day is generally regarded as a miner's wages, which is probably equivalent in purchasing power to about $3.50 in this country.

American Inventions in England.

The Midland Railway of England is fitting up four trains, including fourteen Pullman cars, with Olmstead's electric brake, which Mr. W. B. Chapin is introducing. The cars are also fitted with Miller platforms, and with the Allen paper wheels, which have Krupp's crucible steel tires, costing, it is said, £20 each. The electric brake, it is said, is being tried on the Southwestern and North British lines, and will be tried on roads in France, Russia, Austria, Norway and South America. It was used for sometime in this country on the Chicago, Burlington & Quincy and Providence & Worcester roads, though we believe that it has been improved somewhat of late.

ANNUAL REPORTS.

New York, Providence & Boston.

The road owned by this company extends from Providence R. I., to New London, Conn., 62½ miles, and it operates also the Westerly Granite Quarry Branch, 1½ miles, and the Wickford Railroad from Wickford Junction to Wickford, 3½ miles, making 67½ miles of road in all. The main line is a section of the Shore Line route from New York to Boston.

The operations for the year ending August 31, 1873, as compared with the previous year, were as follows:

Earnings:	1873.	1872.
Passengers	$480,696 17	$445,891 13
Freight	355,077 40	342,539 25
Miscellaneous (including steamboat dividends)	97,857 73	122 590 37
Gross earnings	$933,631 30	$911,020 74
Operating expenses	550,311 35	509 106 65
Net earnings	$383,319 95	$101,914 09

Thus the gross earnings show an increase of $22,610.56, or 2½ per cent.; the expenses an increase of $41,204 70, or 8¼ per cent.; and the net earnings a decrease of $18,594.14, or 4¾ per cent. The passenger and freight traffic is shown in the following tables:

	1873.	1872.
Through passengers carried	173,014	152,962
Local passengers	377,315	363,918
Commuters	106,192	97,301
Total	656,551	614,211
Tons of through freight	188 065	171,134
Tons of local freight	59,689	58,543
Total	247,754	229,677

The operating expenses were 58.94 per cent. of earnings in 1873 and 55.88 per cent. in 1872. The gross earnings were at the rate of $13,832 per mile in 1873 and $13,495 per mile in 1872.

The income account for the year is as follows:

Net earnings		$383,319 95
Received on account of new stock		160,460 00
New bonds sold		45,000 00
Balance from previous year		63 894 46
Total		652,674 41
Dividends and interest	$272,285 00	
Construction account	276,059 29	
Extraordinary expenses (mainly for Richmond switch accident)	25,724 05	
		574,068 34
Balance		$78,606 07

The capital account at the close of the year stood as follows:

	1873.	1872.
Capital stock	$2,500,000	$1,887,400
Less due on account of new stock	452.140	.....
Total	$2,047.860	.....
Funded debt	1,259,000	1,214,000
Total	$3,306 860	$3 101,400

The capital account at the close of the last year being at the rate of $48,990 per mile. Of the bonds $382,000 bear 6 per cent., and $877,000 7 per cent. interest, making a total annual interest charge of $84,310, or $1,249 per mile.

OLD AND NEW ROADS.

St. Paul & Pacific.

The St. Cloud (Minn.) *Journal* of recent date says:

"Hon. F. R. Delano, of St. Paul, who has obtained control of the stock of this line [the Brainerd Branch], informed us a few days ago that there was no prospect of its being built this season. He said he had been unable to make any terms whatever with the representatives of the foreign bondholders. Two propositions had been made by him and those with whom he was acting. One was that the bondholders should complete the branch from Watab to Brainerd, for which he and the parties referred to agreed to pay them one million of dollars in twenty-five years' bonds, drawing seven per cent. interest, secured by a first mortgage on that branch, and by a mortgage on the road from Watab to St. Paul—

allowing the bondholders to retain the land grant. The other was that the bondholders should construct the road and lease it to Mr. Delano for a certain number of years, to be run in connection with the Northern Pacific and the First Division of the St. Paul & Pacific. He said they would accept neither proposition, although the payment of certain over-due interest on the bonds of the First Division road, the payment of certain right of way claims, and the settlement of certain claims held by the Northern Pacific on very favorable terms, were included. Neither would they agree to sell the Branch on any equitable basis.

"Mr. Delano says it is his intention to make application to the next Legislature to declare that the present company has forfeited all right, claim or title to the land grant of the Brainerd Branch, and also to agree to turn the grant over to him, provided he shall construct and put in running order a railroad from Watab to Brainerd. He holds that the failure of the present company to build the road before the 3d of December will not take the land out of the control of the State; that this can only be done by a special act of Congress; and that, as the lands were granted to the State for the purpose of constructing this particular piece of railroad, Congress will not pass such an act until requested to do so by the State Legislature. He supports this view by the action of Congress on the St. Croix grant. He says he is willing to take the risk, and that if the Legislature will agree to turn the lands over to him as soon as *all* the road is built, he will go to work next spring and have the cars running in time for the summer's business."

Oregon & California.

The Frankfort bondholders' committee calls on the bondholders to deposit with a Frankfort bank their bonds, with the coupons, including the October coupon, on which default has been made, with a contribution of one dollar for each $1,000 bond, to pay the necessary expenses, and authority to the committee to act for the bondholders in making a settlement with the company, or foreclosing, so as to take possession of the property for them.

Des Moines & Minnesota.

A recent report says that this company has sent its General Superintendent East to buy iron and rolling stock for the first ten miles of this narrow-gauge railroad, and given him the funds to do it with. Now is a good time to buy iron and rolling stock for those who have got the funds.

Grand Rapids, Greenville & Alpena.

It is reported that the late negotiations have placed the company in good financial condition, and that work will soon be begun on the section from Rockford, Mich. (where it forms a junction with the Grand Rapids & Indiana road 14 miles above Grand Rapids, over which line it is to enter Grand Rapids), eastward to Greenville.

Forced Sales of Bonds.

As an indication of "bottom prices" of certain railroad securities at present, from which it may be in some measure inferred what the prospects of negotiating the bonds of new nompanies are, the following results of an auction sale in New York, October 30, may be interesting: $36,000 Sodus Point & Southern gold 7s, interest due June and December, and the last two coupons attached, at 50; $8,000 South Side of Long Island first-mortgage extension and convertible bonds at 12; another lot of $8,000 of the same at 23. Shares sold at the same time brought one or two dollars less than the prices on the Stock Exchange at the same time.

Chesapeake & Ohio.

The Farmers' Bank of Louisville has brought suit against this company to recover on a note of $30,000, given by the company and discounted by the bank. The note was protested after presentation at the company's office in New York. The Farmers' Bank then sued out an attachment, and garnisheed the Louisville, Cincinnati & Lexington Railroad, which is largely indebted to the Chesapeake & Ohio Railroad.

Lake Ontario Shore.

The Secretary of War has decided the controversy as to the location of the bridge over the Genesee at Charlotte, N. Y., in favor of the company. The company had located the bridge about a quarter of a mile from the mouth of the river, but other parties endeavored to force a location about a mile further from the lake. The work on the bridge can now be pushed forward without delay. It is thought that it will require about three months to build the bridge.

Indianapolis, Bloomington & Western.

A large quantity of new iron has been put into the track between Indianapolis and Pittsboro, 18 miles west. Much of the iron between Pittsboro and Crawfordsville, 26 miles, is now being renewed. A large force has been at work during the present season ballasting the eastern end of the road. On the western end, also, considerable ballasting has been done. The new iron and ballast were much needed, as the track has not been in very good order for some time past.

Dakota Southern.

In the suit to restrain this company from making an issue of $1,200,000 in bonds, after hearing arguments, the District Court for the second judicial district of Dakota has granted the application for a change of venue, and the suit is accordingly to be tried in Clay County. The suit really involves the question of ownership of the road, as it is alleged that a large part of the stock was fraudulently issued. Allegations are also made of fraud in the contract for the construction of the road.

Pennsylvania.

The widening of the Gallitzin tunnel, which has been in progress some time, has been completed. The enlarged tunnel has been arched throughout and an additional track laid through it.

A new branch from Altoona, Pa., to Williamsburg has been completed and opened for traffic. It is designed mainly to accommodate the iron mines of that section.

Rumors have been current of differences between the managers of the road. Recently these reports have been denied by authority of Mr. J. Edgar Thomson, President of the company.

Pennsylvania—Amboy Division.

The steamboat line from South Amboy to New York has been withdrawn and the steamer Richard Stockton laid up. Through freight from the Amboy Division will be transferred to the New York Division by way of Jamesburg and Monmouth Junction. Passengers from below Jamesburg will be sent by the same route. The local passenger travel to New York from stations between Jamesburg and South Amboy will be carried to New York by the Perth Amboy Branch and the New York Division, passengers being ferried across the Raritan from South Amboy to Perth Amboy. The same arrangement was tried last winter, but the steamboat line had to be resumed after a short time.

Pennsylvania—New York Division.

Work on the new Bergen Cut has not been suspended. A reduction of wages caused some of the men to leave, which gave rise to a report that all of them had been discharged. Work still continues as usual.

Work on the new depot in Jersey City progresses rather slowly. The delay is caused apparently by the necessity of waiting for the completion of some of the new ferry slips. These project much further into the river than the old ones, and the new depot is to occupy part of the space now used for ferry purposes, and which cannot be given up until some of the new slips are completed. A considerable force is at work on the slips.

Galion, Logansport & Chicago.

It is reported that officers of the Erie and Atlantic & Great Western companies are making arrangements for the construction of this road, which is to furnish those companies with a line to Chicago. It is proposed to build the road on a line nearly parallel to the Pittsburgh, Fort Wayne & Chicago from Galion to Chicago. The company was organized in Ohio some months since.

Eastern.

The new Marblehead Branch from Swampscott northeast to Marblehead has been completed and opened for traffic. The new branch is four miles long and makes the distance from Boston to Marblehead, 16 miles, or some three miles less than by the old branch which leaves the main line near Salem. The old branch is retained for local traffic between Marblehead and Salem.

Gayville & St. James.

Surveys have been made for this road, which is to be a branch of the Dakota Southern about 15 miles long. It will extend from Gayville, Dak., south to St. Helena, Neb., and thence southeast to St. James.

International & Great Northern.

A large amount of traffic has been sent over this road recently, in consequence of the interruption of travel on the Houston & Texas Central by yellow fever quarantines. Freight is carried over the Texas & Pacific from Dallas to Longview and thence to Houston by the International & Great Northern.

Montpelier & Wells River.

Work on this road is proceeding steadily, and it is expected that the whole road will be opened for traffic by December 1.

Missisquoi.

A connection is to be made between the track of this road and the Southeastern of Canada at Richford, Vt. The connection will be made by a long side track, some little distance below the village of Richford.

Boston & Albany.

The Treasurer of this company advertises for proposals for $1,000,000 of the company's bonds. These bonds are dated February 1, 1872, have 20 years to run, and bear 7 per cent. interest, payable semi-annually. Proposals will be received until November 19, and must be addressed to Charles E. Stevens, Treasurer, at his office, No. 40 State street, Boston. The capital stock of the company by the last published report was $19,664,100, and its funded debt only $3,037,000. Including this new issue of $1,000,000, the funded debt will be only $16,148 per mile of road owned, and the annual interest charge $274,860, or $1,100 per mile. The gross earnings for the year ending September 30, 1872, were $34,551 per mile. There is a sinking fund which, at the close of the last fiscal year, amounted to $1,658,431. The company's road is one of the most valuable properties in the country.

Cincinnati, Lafayette & Chicago.

This company has recently made an agreement of consolidation with the Indianapolis, Cincinnati & Lafayette. The road is now 57 miles long, from Templeton, Ind., northwest to the Illinois Central at Kankakee, Ill. It is said that as a result of the consolidation the road will at once be extended from the present terminus at Templeton eastward 18 miles to Lafayette. Its trains now use the track of the Lafayette, Muncie & Bloomington road between Templeton and Lafayette. The Indianapolis, Cincinnati & Lafayette Company will then have a road 253 miles long from Cincinnati to Kankakee.

Vicksburg & Ship Island.

Mississippi papers report that the contract for the construction of the whole line from Vicksburg to the Gulf of Mexico has been let to a New York construction company, and that work is to be commenced at once. The terms of the contract are not stated, but the road is to be completed by January 1, 1875. The road is intended, we believe, to be of three-feet gauge, and will be about 180 miles long. The contractors are to commence on both ends of the line.

Chester & Tamaroa.

On an appeal from the Circuit Court, the Supreme Court of Illinois has decided that the issue of $100,000 in bonds made by Randolph county in aid of the Chester and Tamaroa Railroad is legal and valid and the interest and principal must be paid when due.

Davenport & St. Paul.

The plans proposed for bringing this road into the city of Davenport, Iowa, have all failed to prove acceptable to the company and the city authorities. It appears probable that the terminus will remain in its present location outside of the city until a final decision is reached in the suit now pending between the city and the company as to the right of the latter to lay down its track on certain streets which it proposed to use.

New York & Oswego Midland.

Certificates of indebtedness are being issued to the employees of the company for the arrears of pay due them up to the time the Receiver took possession. The arrears are from four to six months pay. It is stated that these certificates are in many cases cashed at a discount in Jersey City.

Southern Pacific, of California.

The telegraph announces that the branch line which the company was building from the Los Angeles & San Pedro road is completed. The company will at once commence work on another branch of that road, which is to extend to San Bernardino. The people of San Bernardino have been asked to vote aid to the construction of this branch. The company is building a telegraph line from Los Angeles south to Florence and north to San Fernando.

Changes of Time at New York.

The lines leading westward from New York commenced running on their winter time-tables November 3.

On the Pennsylvania Railroad the western train leaving New York at 7 p. m. has been dropped. The other trains leave as heretofore at 9:30 a. m., 5 and 8:30 p. m. In the southern trains the morning express for Washington leaves 20 minutes earlier. Trains now leave New York for Washington at 8:40 a. m., 3 and 9 p. m., going by the Baltimore & Potomac, and at 7:30 p. m. by the Baltimore & Ohio. Little change is made in the Philadelphia express trains, but the two Philadelphia accommodation trains leaving New York at 7:20 a. m. and 6:10 p. m., hereafter run only to Trenton. Little change is made in the local time-tables, the suburban traffic on this road being very little affected by the season.

On the Erie there is no change except in the morning train, which leaves at 9 a. m., instead of 8:40. The evening train continues to leave at 7 p. m., and the express mail at 10:45 a. m., as heretofore. The latter train runs by way of the Newark Branch. Little change is made in the local time-tables.

On the New York Central & Hudson River, the morning express at 8 a. m.; the northern express at 10:45 a. m.; the Montreal express at 4 p. m., and the night express at 11 p. m. are not changed. The special Chicago express leaves at 10:30, instead of 10 a. m.; the first Pacific express at 6, instead of 7 p. m., and the second Pacific express at 8, instead of 8:30 p. m. The Saratoga special trains were dropped some time since. There is a special express to Albany and Troy at 3:40 p. m. on Saturday only.

The New York, New Haven & Hartford road, the New Jersey Central and the Delaware, Lackawanna & Western are still running on their summer time-tables.

The various steamboat lines to Boston have made the usual winter change of starting time from 5 to 4 p. m.

California & Texas Construction Company.

At a meeting of the stockholders of this company (which has the contract for building the Texas & Pacific road) in Philadelphia, October 30, a resolution was adopted providing for the sale of first-mortgage bonds to the stockholders of the company in order to secure means to go on with the work.

Some notes given by this company, which were due in Philadelphia, November 4, were not paid on that day. The difficulties of the company are said to arise from the impossibility of realizing on its assets. The liabilities of the company are reported to be nearly $7,000,000, of which $4,500,000 is in notes, $1,600,000 in loans, and $850,000 in drafts and other floating debt unsecured. This amount, with $4,000,000 of cash paid in on the stock, has been expended on the road. The resources consist of $35,000 of Texas & Pacific bonds for each mile of finished road, and over $2,000,000 of payments due on the stock of the Construction Company. Most of this will, it is stated, be promptly paid. The $1,600,000 of loans are mostly secured by collaterals or by individual stockholders. The condition of the company appears to depend upon the promptness with which the individual stockholders respond to the resolutions recommending them to purchase the Texas & Pacific bonds held by the company.

Des Moines Valley.

In the United States Circuit Court at Des Moines, Ia., the attorney for the first-mortgage bondholders moved to confirm the sale of the road from Keokuk to Des Moines, which was done. The attorney for the second-mortgage bondholders moved to set aside the sale of the road from Des Moines to Fort Dodge, alleging fraud in the sale. Notice was also given of a motion to remove the Receiver, Mr. Smyth, on account of action said to be prejudicial to the interest of the bondholders. No action was taken on the two last motions.

The second-mortgage bondholders allege that the road from Des Moines to Fort Dodge was bonded for $40,000 per mile, which was more than the whole property, including the land grant, was worth. They also charge that under the provision allowing the bonds to be exchangod for land, certain parties secured nearly the whole land grant. These parties, it is claimed, have now organized the Keokuk & Northwestern Company, which purchased the upper end of the road at the recent sale. It is also charged that, through representations made that the sale would not take place, many of the bondholders failed to deposit their bonds in time to secure representation on the Purchasing Committee at the sale.

Mr. W. S. Gilman, one of the trustees of the mortgage, who concurred in the petition to reopen the case, states that he did so merely on the ground of a misunderstanding as to the time of the sale.

The case will come up in court November 20, when the question as to confirming the sale of the line from Des Moines to Fort Dodge will be decided.

Bangor & Bucksport.

The first cargo of rails for this road has been received at Bucksport, Me., and tracklaying will be commenced shortly. The stockholders have voted to issue first-mortgage bonds, payable in 30 years, to an amount not exceeding $400,000.

New Haven, Middletown & Willimantic.

A writ of mandamus has been issued requiring the selectmen of the town of Chatham, Conn., to appear and show cause why they should not be ordered to issue the bonds voted to the road by that town, which have not yet been issued.

Des Moines Valley.

Reports are current that by the recent sale the Chicago, Barlington & Quincy Company obtains control of the road.

Rochester & State Line.

A construction train is at work laying track from Rochester, N. Y., southwest. Enough iron is on hand to lay some 25 miles, which will take the road beyond Leroy. The road-bed is said to be in very good condition. The work of ballasting will be commenced as soon as track enough is laid to enable a ballast train to work to advantage.

Baltimore & Ohio.

In addition to the men discharged from the Mount Clare shops in Baltimore, the company has discharged 200 men from the Piedmont shops and 120 from the rolling mill at Cumberland.

Milwaukee & Northern.

An injunction has been obtained to restrain the company from using part of a street in Green Bay, Wis. It is thought that this will oblige the company to make a change in the location of its depot. Work on the bridge over Fox River at Green Bay is being pushed forward.

Houston & Texas Central.

The fear of yellow fever along the line of this road has somewhat abated, and the quarantines have all been raised, except that at Bremond, the junction of the Waco Branch with the main line.

International & Great Northern.

This company is now repairing and putting in order the old Houston Tap & Brazoria road, which it owns. This road was for some years in operation from Houston, Tex., south by west to Columbia, 50 miles, but it has for some time been abandoned and not in use. The road-bed has been put in order and track laid from Houston southward 14 miles, and work is proceeding rapidly. It is intended to have the whole line to Columbia open this fall. This is the line which is to give the roads centering at Houston an outlet to a new port and city to be created at the mouth of the Brazos.

Dallas & Wichita.

The vote taken in Dallas, Tex., some time since in favor of granting aid to this road will, it is said, have to be taken over again, owing to certain informalities in the first election.

Cincinnati Southern.

A report comes by way of Lexington, Ky., that the trustees of this road have resolved to locate the road on the route passing through Lexington. The report does not appear to come very directly, and nothing official has been made public on the matter.

East Tennessee, Virginia & Georgia.

The enginemen, firemen and a large portion of the men employed in the repair shops of this company struck recently on account of a reduction of wages. The company succeeded in securing men enough to run the mail trains, but, with that exception, all traffic on the road was stopped. No violence was used by the strikers, who expressed a willingness to work on short time but refused to accept any reduction of pay beyond that corresponding to the reduction in time.

New York & Long Branch.

This company is again endeavoring to raise subscriptions along the line of the road. A contract has been filed with the

Secretary of State of New Jersey by which the Central Railroad Company of New Jersey agrees to lease the New York & Long Branch road and guarantee 7 per cent. interest on the stock. It is stated that the Central Company has already expended $500,000 on the section of the road from Elizabethport to Perth Amboy and the bridge over the Raritan at the latter place.

St. Louis, Vandalia & Terre Haute.

The oil house of this company in East St. Louis took fire on the afternoon of October 31, and was destroyed with the round house and two locomotives. The water tank and machine shop was saved. The loss is stated at about $40,000.

Jackson, Lansing & Saginaw.

This company lately discharged some 200 trackmen, and reduced the wages of those retained. The reduction, however, was but little more than is usually made at the opening of winter.

Continental Fast-Freight Line.

The two fast-freight lines known as the "Red Stripe Continental" and "White Stripe Continental" have been consolidated under one management with Mr. McLene Doherty, of the White Stripe Line, as General Manager. The principal office of the line will be in Cincinnati. The line runs to Cincinnati and St. Louis, over the Baltimore & Ohio road.

Cairo & Fulton.

The engineers are engaged in making surveys for the location of the terminus at Texarkana. The section from Fulton to Texarkana, 18 miles, is ready for the rails. The last of the iron has been shipped from Pittsburgh. The bridge over the Arkansas River at Little Rock is well advanced and will, it is expected, be finished by December 1.

The telegraph line has been completed as far as Jacksonport, Ark., on White River, and is being rapidly extended toward Texarkana.

Kansas City, Memphis & Mobile.

Kansas city papers state that the tunnel on this road at Westport, Mo., 3½ miles southwest of Kansas City, was completed October 30. The tunnel is 403 feet long, and a great portion of it is through solid rock.

Selma, Marion & Memphis.

The company is negotiating for iron to lay the track from the present terminus at Sawyer's, Ala., northwest to Eutaw, 15 miles, and on the western end of the road from Memphis, Tenn., southeast to Holly Springs, Miss., 45 miles.

New Railroad Postal Car Line.

Traveling post-office cars commenced running October 28 on the new line from Indianapolis, Ind., to Galesburg, Ill., over the Indianapolis, Bloomington & Western from Indianapolis to Peoria and the Chicago, Burlington & Quincy from Peoria to Galesburg. The distance is 265 miles, and one trip each way daily is made.

Philadelphia & Erie.

The Philadelphia Common Council has postponed indefinitely the question of the investigation into the accounts of this road which has beenpending before it for some time.

Meetings.

A meeting of the stockholders of the Rock Island, Alton & St. Louis Railroad Company will be held at the office of the Rockford, Rock Island & St. Louis Company at Rock Island, Ill., November 27.

New Haven, Middletown & Willimantic.

The Equipment Committee appointed by the first-mortgage bondholders has made arrangements for securing all the additional equipment needed this fall. It is thought that with the new facilities the earnings can be largely increased.

New Mail Routes.

Mail service, to commence November 1, has been ordered on the following lines:

On the Mount Alto Railroad, from Chambersburg, Pa., to Mount Alto, 15 miles.

On the Williamstown Railroad, from Atco, N. J., to Williamstown, 9 miles.

On the extension of the Lake Ontario Shore Railroad, from Sodus, N. Y., to Ontario, 12 miles.

On the Eastern Extension of the Allegheny Valley Railroad, from Driftwood to Benezette, 17 miles, and from Red Bank to Reynoldsville, 59 miles.

New York, New Haven & Hartford.

The Hartford shops, which employ some 300 men, are now running only eight hours per day, the pay of the men being reduced one-fifth. No change has been made in the New Haven shops as yet, although it is stated that the eight-hour rule will soon be adopted there also.

Eastern.

Steel rails are being laid at several points on the road where the travel is heaviest. The company has just turned out an anthracite coal-burning engine, the third on the road, from the East Boston shops.

Southbridge & Brookfield.

Meetings are being held to advocate the building of a railroad from Southbridge, Mass., the terminus of the Southbridge Branch of the New York & New England road, north to East Brookfield, a distance of about 12 miles. At East Brookfield connection would be made with the Boston & Albany and the projected Worcester County Central.

International Bridge.

The last span was successfully placed October 30, and the laying of the track on the bridge was completed November 1. The first train passed over the bridge November 3, and the bridge will shortly be opened for traffic. The bridge, or rather bridges, for there are in reality two, consists of a bridge over the main branch of the Niagara River 1,890 feet long, having four spans of 190 feet clear and three of 240 feet, with a draw-span 362 feet long, having two clear openings of 160 feet each. From the eastern end of this section a trestle-work 1,300 feet long leads across Squaw Island to the second bridge. This trestle-work is to be filled up with earth. The second bridge, across Black Rock Harbor is 440 feet long, and has one fixed span 220 feet in the clear and a draw with two clear openings of 90 feet each. The piers are built on caissons, either sunk to the bed-rock or founded on piles. The superstructure is a Pratt truss of wrought iron. The contractors for the substructure were C. S. Gzowski & Co., of Toronto, and the superstructure was built by the Phœnixville Bridge Works, at Phœnixville, Pa. The first caisson was launched July 13, 1870, and work has proceeded steadily since that time. Mr. E. P. Hannaford (Engineer of the Grand Trunk Railway) was Chief Engineer. Connections have been made with the bridge by the Grand Trunk and Canada Southern from the west and the Erie and New York Central & Hudson River from the east. The Great Western Company, we believe, has not yet completed arrangements for the use of the bridge. The cost of the bridge is stated to have been about $1,500,000.

Springfield, Athol & Northeastern.

The track of the extension from Barrett's to Springfield is completed to that city, but has not yet reached the depot. The completion has been delayed on account of the construction of a sewer and other city works. Arrangements have been made by which the road will have the use of a side-track belonging to the Boston & Albany road on which to run trains from Spring street, in Springfield, to the depot. The engine-house is completed, and workmen are grading around the engine-house and yard.

Portsmouth & Dover.

The work of tracklaying on this road is progressing steadily.

Maine Central.

The passenger train cars of this road are all being fitted with the Miller platform and coupler in the shops at Augusta, Me.

Bangor & Calais Shore Line.

The directors at a recent meeting voted to make Bucksport, Mo., the Penobscot terminus of the line, there being no hope of Bangor taking any action to aid the road. A vote was also unanimously adopted to petition the Legislature for a railroad bridge across the Penobscot at Bucksport. All the towns on the line have voted aid to the road except Bucksport, Orrland and Calais. If these towns also vote aid, which is thought to be certain, work will be commenced at once.

Burlington & Southwestern.

Track has been laid from the late terminus at Unionville, Mo., southward six miles. The work is progressing steadily.

Bangor & Bucksport.

It is stated that the chief contractor has left the work with the professed object of going to New York to procure funds. Work has been stopped and the sub-contractors have attached the contractor's property. Work on the bridge over the Penobscot at Bangor, Me., has also been stopped.

Providence & Worcester.

This company has leased a granite quarry near Milford, Mass., on the line of the Hopkinton Branch, and is preparing to work it extensively.

New York, West Shore & Chicago.

It is reported that the work on the tunnel at West Point, N. Y., has been stopped and that the property and tools of the contractors have been attached by the workmen, who have received no pay for some time. This tunnel, we believe, was the only work in progress on the road.

European & North American.

This company has concluded a contract with the Eastern Express Company, which will hereafter do all the express business over the road.

New Jersey Southern.

It is stated that about $700,000 is due to officers of the company ($600,000 of this being to Jay Gould) for loans made, which is secured by bonds. In addition to this, $300,000 is due to outside creditors. About $375,000 is needed to complete the Delaware line and ferries. A committee has been appointed to arrange the floating debt and raise means to complete the road.

Geneva & Ithaca.

The stations on this recently completed New York railroad are named as follows: Ithaca, Pinkney, Ganoung, Taghanic, Trumansburg, Covert, Farmers, Van Liew's, Ovid, Hayt's Corners, Romulus, West Fayette, Rose Hill, Geneva.

Camden & Atlantic.

A large piece of property has been secured in Atlantic City, N. J., on which a new passenger and freight depot will be erected.

Atlantic & Great Western.

The company has discharged 600 trackmen along the line. It is usual, however, to make some reduction in the force at this season. The machine shops at Meadville, Pa., are now running only eight hours daily.

The contract for the extension of the Shenango Branch from Harrisville, Pa., to the head of Bull Valley, 14 miles, requires the work to be completed by January 1, 1874.

Philadelphia & Reading.

Cable dispatches announce concerning the new loan of $10,000,000, bearing 6 per cent. gold interest, which was put upon the London market October 22, that in three days subscription enough to cover the whole loan were received. The subscriptions were closed October 27.

The Brotherhood of Locomotive Engineers.

The Grand International Division remained in session ten days before the final adjournment. It was voted to hold the next annual meeting in Atlanta, Ga.

Mississippi Central.

The property of the Southern Railway Association in Ballard County, Ky., has been attached by a firm of contractors, who claim $40,000 due them for work done on the Mississippi Central Extension to Cairo. Work has been stopped for the present. The track is laid to Neville, Ky., 65 miles bevond Milan, Tenn., the late terminus, and about 15 miles from Cairo, Ill.

North Pacific Coast.

The grading for this narrow-gauge road is completed from Saucelito, Cal., to White's Hill. No further work will be done between White's Hill and Tomales this fall, except on the tunnels. Work on these will continue all winter.

Wisconsin Central.

Work on the road from Ashland, Wis., southward has been suspended for the winter. The grading is still progressing on the southern end of the line, from Stevens' Point northward.

Louisville, New Albany & Chicago.

It is reported that the officers of this company are considering a plan for extending the business of the company and also entering the iron business. According to the plan, several short branches are to be built from the main line to coal mines in Martin, Owen and Greene counties in Indiana, and to the iron deposits in Martin, Monroe, Putnam and Greene counties. In connection with these, blast furnaces are to be built at New Albany, Ind., and extensive coal depots established in New Albany and also in Louisville, Ky.

Erie.

The double track on the Delaware Division is completed from Port Jervis to Lackawaxen, 23 miles, except at the Shohola bridge. This bridge is a stone arch over the Shohola Creek, and it will require some time yet to complete it. The work of grading for the second track between Pond Eddy and Shohola was very heavy.

By a new order, which went into force November 3, passenger conductors will hereaftor have no regular train, but will be ordered out on any train, as may be most convenient. The rule probably applies only to the through trains.

Texas, Mississippi River & Northwestern.

The Little Rock, Pine Bluff & New Orleans and the Mississippi, Ouachita & Red River Railroad companies have been consolidated under the title of the Texas, Mississippi River & Northwestern Railroad Company. The Little Rock, Pine Bluff & New Orleans road is completed from Chicot, Ark., on the Mississippi River, northwest to Pine Bluff, 75 miles. It is to be extended north by west, 40 miles further to Little Rock, and the grading for this extension is partly finished. The authorized capital stock is $1,200,000, with an issue of bonds to the amount of $10,000 per mile. The Mississippi, Ouachita & Red River road is intended to run from Chicot west to Fulton on Red River, 190 miles, and is completed from Chicot to Monticello, 36 miles, with some grading done beyond that point. The company is authorized to issue $2,000,000 in stock, and $12,000 per mile in bonds. The terms of consolidation have not been made public. The two companies have been owned by substantially the same parties, and have had the same officers.

Alton & Grafton.

A railroad is proposed, to run from Alton, Ill., westward up the Mississippi to Grafton, a distance of about 15 miles. At Grafton there are extensive stone quarries.

Grand Rapids, Greenville & Alpena.

It is stated that work will shortly be commenced on the grading of the section from Greenville, Mich., northeast to Rockford. Arrangements have been made by the company to secure the necessary funds. The grading is to be carried on as far as possible through the winter with the intention of completing the line early in the spring.

Long Island.

The new branch from Newtown to Flushing is completed, and was to be opened for travel November 3. The branch is about four miles long, and will bring the Long Island road into direct competition with the Flushing & North Side for the travel between Flushing and New York.

Toledo & Louisville.

Since the organization of this company nine elections on the question of extending aid to it have been held in various parts of Henry County, Ind., and in seven out of the nine the proposition has been defeated.

Grand Rapids & Indiana.

This road is now completed to Little Traverse Bay, Mich., 10 miles north of Bear Creek, the late terminus, and about 172 miles from Grand Rapids. About five miles more of track is to be laid before work is closed for the year.

Cumberland Valley.

The bridge over the Susquehanna at Harrisburg, Pa., has been almost entirely rebuilt this season. Three spans, next the eastern end, are not yet completed.

New Jersey Midland.

In the United States District Court for New Jersey, recently, a petition in bankruptcy was filed against this company by the First National Bank of Jersey City. An order to show cause was granted, returnable November 4.

South Branch Extension.

The necessary amount of stock has been subscribed and articles of incorporation have been filed with the Secretary of State of New Jersey for this company. The road is to be an extension of the South Branch Railroad from Flemington, N. J., southwest to the Delaware river at Prallsville, five miles north of Lambertsville. The road will be about nine miles long. It is reported that the Doylestown Branch of the North Pennsylvania Railroad will be extended to the Delaware at Prallsville, forming a new line from New York to Philadelphia by the New Jersey Central, South Branch and North Pennsylvania roads.

Richmond & Chesapeake.

This company is now running a daily line of steamers from West Point, Va., the York River terminus of the road, to Baltimore. Arrangements are being made for a connection through the city of Richmond with the Richmond & Danville road, so that cars can be transferred.

Detroit, Eel River & Illinois.

The extension of 12 miles from the late terminus at Auburn Junction, Ind., northeast to a connection with the Lake Shore & Michigan Southern at Butler is nearly completed and will be ready for travel some time in November. A large passenger house and grain depot is being built by the Lake Shore company at Butler. The round-house of the Detroit, Eel River & Illinois road at Butler is nearly finished, and it is said that repair shops will be built in that place.

Washington, Cincinnati & St. Louis.

The town of Harrisonburg, Va., has completed its subscription of $50,000 to the stock of this company. The subscription is payable in town bonds, to be issued as the work progresses. Some eight miles of the road westward from Harrisonburg is graded, and work is progressing.

Stockton & Ione.

The contract for the grading of this narrow-gauge road has been let, and work is to be commenced within 30 days. The road will be 38 miles long, from Stockton, Cal., to Ione, and will furnish transportation to a new coal district.

Wilmington & Western.

This company failed to pay the quarterly interest due on its bonds in October, and several meetings of the bondholders have been held. It has been proposed that Colonel McComb, of Wilmington, shall take the road and complete it westward to Oxford and build the extension through Wilmington to the Delaware. This plan, which is now under consideration, proposes that the company should be reorganized, with a capital stock of $600,000 and an issue of $600,000 in first-mortgage bonds. The present stockholders are to receive 25 per cent. of their present holdings in new stock, the bondholders to surrender their bonds and past-due coupons and receive 75 per cent. of the amount in new bonds at par, and 25 per cent. in new stock. The floating-debt creditors to receive new stock. The remainder of the new stock and bonds to be used to complete the road.

The road is now 20 miles long, from Wilmington, Del., to Landenburg, Pa., and the extension to Oxford will be about 16 miles long. The present issue of bonds is $500,000, and the capital stock subscribed is about $250,000. It is thought that the plan proposed will be adopted.

Two lines have been surveyed for the extension to Oxford, but no final location has been made.

Green Bay & Minnesota.

The District Court of Trempeleau County, Wis., has decided that the subscription of $50,000 voted by the town of Arcadia to this company is valid, and that the bonds must be issued. An appeal is to be taken to the Supreme Court.

Kalamazoo, Lowell & Northern Michigan.

The stockholders have resolved to begin work in the spring, and surveying parties are to be put on the road at once. An assessment of 5 per cent. on the stock has been ordered. In Hastings, Mich., considerable subscriptions have been made, and the right of way for eight miles donated.

Allegheny Valley—Eastern Extension.

The track is laid to the Summit Tunnel, 24 miles beyond the late terminus at Brookville and 65 miles from the junction with the main line at Red Bank. Work on the Summit Tunnel, which is 1,975 feet long, is progressing, but it will take some time yet to complete it, as the whole length of the tunnel has to be arched. It is thought that the road will not be opened through before the close of the year. Passenger trains are running to Reynoldsville, 59 miles from Red Bank.

Northern Pacific—Pacific Division.

The President has approved the report of the commissioners who examined the 65 miles of road from Kalama, W. T., to Tenino, and has directed patents to be issued for the lands to which the company is entitled for that section.